EMUNDS + STAUDINGER

Instructions for use

Double slide-rail shoring E+S

Double slide-rail linear shoring

Double slide-rail innercity shoring

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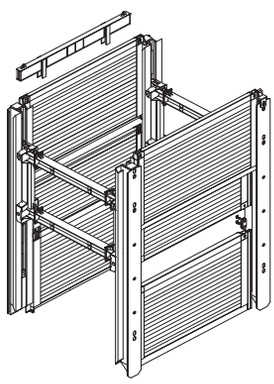
System overview

Double slide rail linear shoring (RD)

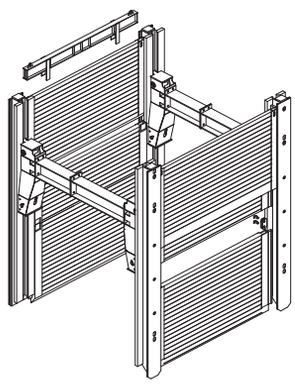


Module length	2,25 m - 6,50 m
Length slide rail	5,13 m - 9,13 m
Panel height	1,32 m / 2,32 m
Pipe culvert height	variable

Designation for slide-rail system X conforming to EN 13331-1:

e. g.: RD - X - FR - F - 6,13 - 0,90 / max. - 1,35 / max.

Double slide rail linear shoring U-type roller unit (RD)

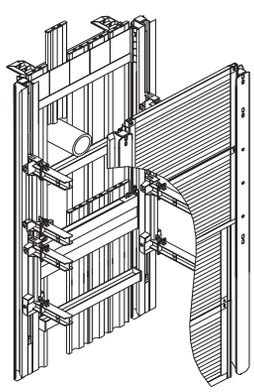


Module length	2,25 m - 6,50 m
Length slide rail	5,13 m - 9,13 m
Panel height	1,32 m / 2,32 m
Pipe culvert height	variable

Designation for slide-rail system X conforming to EN 13331-1:

e. g.: RD - X - FR - F - 6,13 - 0,90 / max. - 1,35 / max.

Double slide rail innercity linear shoring (RD)



Module length	3,70 m
Length slide rail	5,13 m - 9,13 m
Height sheet pile element	1,00 m
Length sheet piles (KD VI / 8)	variable

Designation for slide-rail system X conforming to EN 13331-1:

e. g.: RD - X - FR - F - 8,13 - 0,90 / max. - 1,35 / max.

Occupational safety and general remarks according to DIN EN 13331-1/2

Lifting, handling, pulling, dragging

Handling should be carried out as close to the ground as possible.

Slings (chain type and thickness, load hooks) must be chosen to suit the weight being handled (e.g. trench box or slide rail).

To prevent the accidental detachment of the load during lifting, pulling or handling, only load hooks with safety catches may be used.

Particularly when pulling loads, the pulling forces defined in section 7.4.16 in DIN EN 13331/1 must be observed.

The load must be slung in such a way that the shoring is in a horizontal position and swinging during handling is reduced to a minimum.

The shoring must be lowered onto level and firm ground.

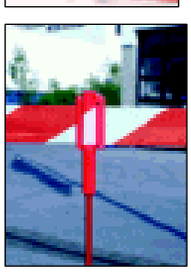
It is prohibited to stand within the pivoting range of the excavator/crane and beneath suspended loads.

A load operator may only stand to the front left of the excavator, in constant eye contact with the machine operator.

It is always prohibited to stand within the danger zone.

Observe the industrial safety ordinance and the accident prevention regulations for lifting gear.

Measures to reduce hazards



The safety of vehicles and persons on site must be ensured with the aid of cones, warning tape or safety staff specially deployed for this purpose.

The construction site should be sufficiently marked as such with the aid of warning signs, for instance.

The risk of instability as a consequence of wind loads when setting up the shoring on the edge of the trench must be considered.

The shoring should be secured against accidental impacts and set up in a sufficiently stable position (sufficient width and firm ground).

When handling, installing and removing shoring, watch out for overhead power cables.

On sloping or uneven ground, the shoring should be set up if possible at right angles to the slope.

Reasons for taking parts out of service and instructions for repair

Before use, all shoring components must be checked for their correct function.

Reasons for taking worn or damaged parts out of service include:

- Missing parts, such as nuts, screws, posts, pins and stabilizers.
- Broken parts such as spindles, pins and spreader systems in general.
- If parts are severely deformed or misshapen or if there are holes in panel bodies, for instance, the manufacturer should be consulted in cases of doubt.
- In all cases of doubt, always consult the manufacturer.

Faulty parts must be replaced or repaired.

Minor repairs can be carried out by the user, after consultation with the manufacturer.

Only original replacement parts from the manufacturer may be used.

There is no warranty on incorrectly performed repairs and the use of non-original parts.

The requirements of the industrial safety ordinance apply.

Procedure in the event of an accident

In the event of an accident, casualties must be given first aid immediately.

The scene of the accident must be cordoned off and left unchanged.

If the injured person is expected to be unfit for work, an accident insurance doctor must be consulted.

All accidents must be reported immediately to the superior or his deputy.

The accident must be entered in the accident record book.

The currently valid versions of the following documents apply:

- Provisions of the Civil Engineering Committee of the Accident Insurance Institution
- DIN 4124 "Baugruben und Gräben" (pits and trenches)
- DIN EN 13331, Part 1: Product Specifications, Part 2: Assessment by Calculation or Test
- General safety instructions and the relevant industrial safety ordinances

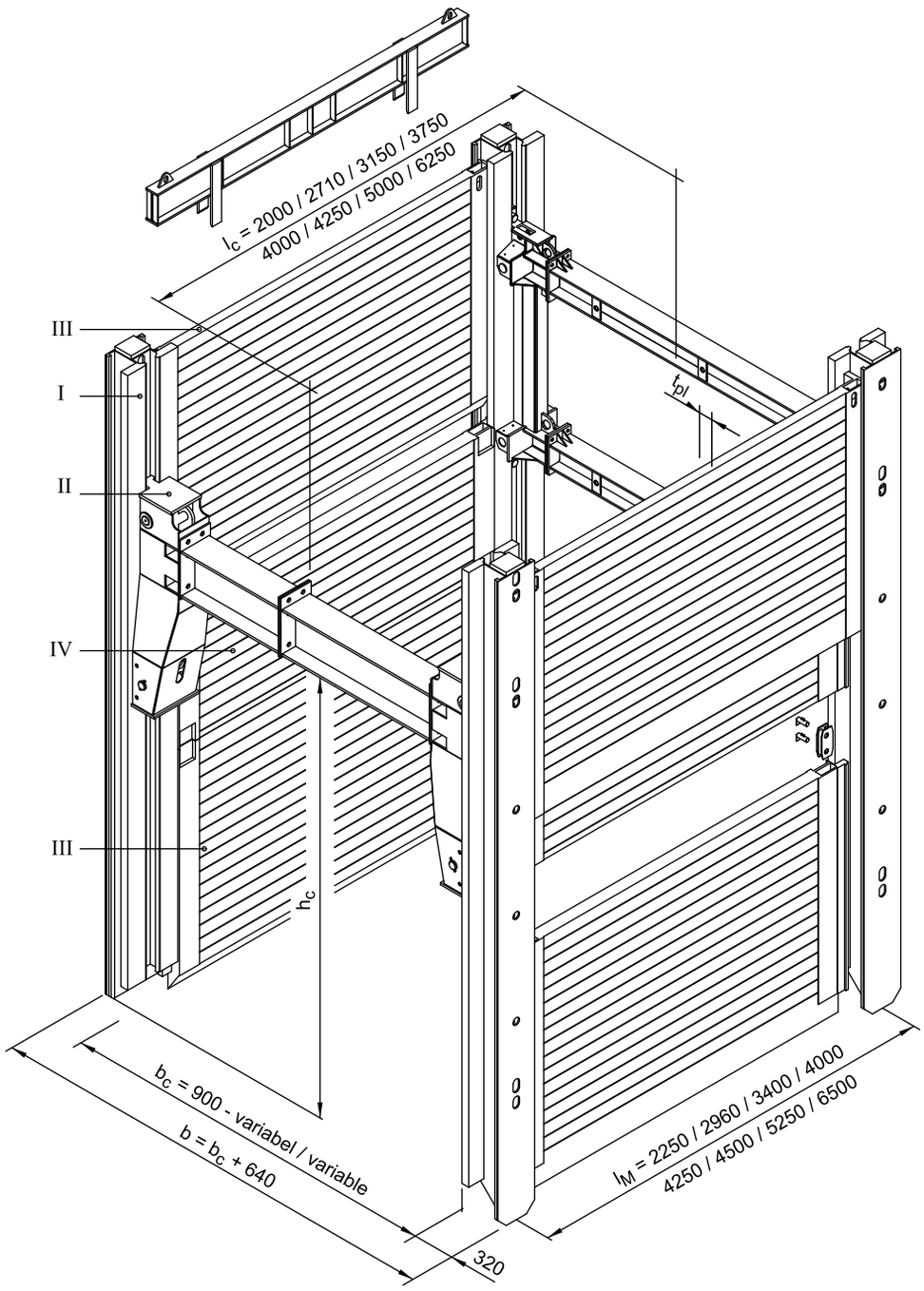
Our products bear the "Geprüfte Sicherheit" (GS) quality seal.

During installation, the instructions contained in the manufacturer's manual must be referred to and observed.

Technical data sheet double slide-rail shoring (RD)

Double slide rail system Linear shoring with U-type boogie car

Double slide rail system Linear shoring



I	Linear shoring support	l_c	Pipe culvert length
II	Boogie car	b	Shoring / trench width
III	Base panel	b_c	Inner width
IV	Top panel	h_c	Pipe culvert height
l_M	Module length	t_{pl}	Thickness

Overlapping linear shoring with U-type or rectangular roller unit

(All dimensions in mm. The details of length of pipe opening l_c refer to the rectangular roller unit.)

Double slide rail system Linear shoring

Linear shoring support

Art. No.	**l [m]**	G [kg]
820 912	**5,13**	995,0
820 915	**6,13**	1.200,0
820 920	**7,13**	1.410,0
820 924	**8,13**	1.865,0
820 929	**9,13**	2.348,0

Linear shoring support with injection pipe

Art. No.	**l [m]**	G [kg]
820 921	**7,13**	1.522,5
820 922	**7,63**	1.575,0
820 926	**8,13**	1.775,4

Linear shoring boogie car

Art. No.	Short description	l [m]	G [kg]
832 200	Linear shoring rectangular boogie car	2,00	420,0
832 215	Linear shoring rectangular boogie car	2,20	465,0
832 205	Linear shoring U-type boogie car	2,00	550,0

Base panel -outside- (Height 2,32 m)

Art. No.	**l [m]**	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	eh [kN/m²]
821 150	**2,00**	2,25	0,11	2,00	540,0	4,64	149,00
821 170	**2,71**	2,96	0,11	2,71	670,0	6,29	80,00
821 310	**3,15**	3,40	0,11	3,15	755,0	7,31	59,00
821 770	**3,75**	4,00	0,11	3,75	865,0	8,70	49,00
821 910	**4,00**	4,25	0,11	4,00	985,0	9,28	41,40
821 913	**4,25**	4,50	0,15	4,25	1.225,0	9,86	75,00
821 912	**5,00**	5,25	0,15	5,00	1.545,0	11,60	54,50
821 916	**6,25**	6,50	0,15	6,25	1.910,0	14,50	34,70

Top panel -outside- (Height 1,32 m)

Art. No.	**l [m]**	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	eh [kN/m²]
822 075	**2,00**	2,25	0,11	2,00	365,0	2,64	149,00
821 190	**2,71**	2,96	0,11	2,71	450,0	3,58	80,00
822 310	**3,15**	3,40	0,11	3,15	510,0	4,16	59,00
822 710	**3,75**	4,00	0,11	3,75	580,0	4,95	49,00
822 810	**4,00**	4,25	0,11	4,00	640,0	5,28	41,40
822 813	**4,25**	4,50	0,15	4,25	900,0	5,61	75,00
822 815	**5,00**	5,25	0,15	5,00	1.130,0	6,60	54,50
822 830	**6,25**	6,50	0,15	6,25	1.400,0	8,25	34,70

Top panel -outside- (Height 2,30 m)

Art. No.	**l [m]**	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	eh [kN/m²]
822 820	**5,00**	5,25	0,15	5,00	1.700,0	11,50	54,50

Base panel -inside- (Height 2,32 m)

Art. No.	**l [m]**	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	eh [kN/m²]
821 120	**1,89**	2,25	0,11	2,00	516,0	4,38	176,00
821 160	**2,60**	2,96	0,11	2,71	650,0	6,03	90,00
821 250	**3,04**	3,40	0,11	3,15	730,0	7,05	65,50
821 610	**3,64**	4,00	0,11	3,75	840,0	8,44	45,20
821 850	**3,89**	4,25	0,11	4,00	965,0	9,02	39,40
821 855	**4,14**	4,50	0,15	4,25	1.185,0	9,58	81,00
821 860	**4,89**	5,25	0,15	5,00	1.505,0	11,34	58,10
821 861	**6,13**	6,50	0,15	6,25	1.880,0	14,22	36,60

The details of length of pipe opening l_c refer to the rectangular roller unit.

Double slide rail system Linear shoring

Top panel -inside- (Height 1,32 m)

Art. No.	**l [m]**	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	eh [kN/m²]
822 060	**1,89**	2,25	0,11	2,00	355,0	2,49	176,00
821 180	**2,60**	2,96	0,11	2,71	445,0	3,43	90,00
822 120	**3,04**	3,40	0,11	3,15	500,0	4,01	65,50
822 620	**3,64**	4,00	0,11	3,75	570,0	4,80	45,20
822 760	**3,89**	4,25	0,11	4,00	635,0	5,13	39,40
822 783	**4,14**	4,50	0,15	4,25	870,0	5,45	81,00
822 800	**4,89**	5,25	0,15	5,00	1.090,0	6,45	58,10
822 801	**6,13**	6,50	0,15	6,25	1.370,0	8,09	36,60

Top panel -inside- (Height 2,30 m)

Art. No.	**l [m]**	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	eh [kN/m²]
822 065	**1,89**	2,25	0,11	2,00	530,0	4,35	176,00
822 155	**2,60**	2,96	0,11	2,71	660,0	5,98	90,00
822 180	**3,04**	3,40	0,11	3,15	740,0	6,99	65,50
822 680	**3,64**	4,00	0,11	3,75	845,0	8,37	45,20
822 780	**3,89**	4,25	0,11	4,00	975,0	8,95	39,40
822 785	**4,14**	4,50	0,15	4,25	1.409,0	9,50	81,00

Base panels, inner, reinforced (height 2.32 m)

Art. No.	**l [m]**	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	eh [kN/m²]
821 249	**3,04**	3,40	0,15	3,15	982,0	7,05	154,40
821 248	**3,64**	4,00	0,15	3,75	1.125,0	8,44	106,50

Top panels, inner, reinforced (height 2.30 m)

Art. No.	**l [m]**	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	eh [kN/m²]
822 181	**3,04**	3,40	0,15	3,15	1.080,0	6,99	154,40
822 182	**3,64**	4,00	0,15	3,75	1.220,0	8,37	106,50

Base panel -inside- with injection pipe (Height 2,32 m)

Art. No.	**l [m]**	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	eh [kN/m²]
821 251	**3,04**	3,40	0,12	3,15	810,0	7,05	63,00
821 615 A	**3,64**	4,00	0,12	3,75	890,0	8,44	43,50
821 827 A	**3,89**	4,25	0,12	4,00	980,0	9,02	43,90

Top panel -inside- with injection pipe (Height 1,32 m)

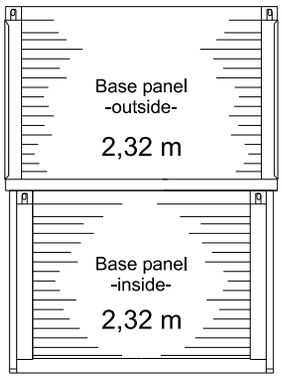
Art. No.	**l [m]**	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]	eh [kN/m²]
822 130	**3,04**	3,40	0,12	3,15	572,0	4,01	63,00
822 660	**3,64**	4,00	0,12	3,75	670,0	4,80	43,50

l	Length	A	Area
l_M	Module length	G	Weight
l_c	Pipe culvert length	G / VP	Weight per shoring panel
b	Shoring / trench width	d	Diameter
b_c	Inner width	eh	Earth pressure max.
t_{pl}	Thickness		

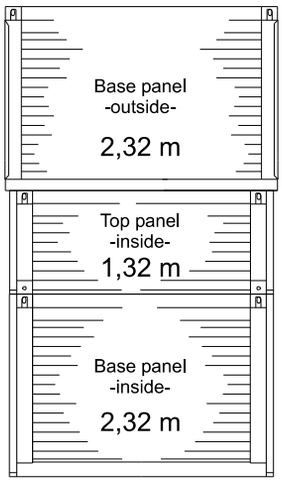
The details of length of pipe opening l_c refer to the rectangular roller unit.

Double slide rail system Linear shoring

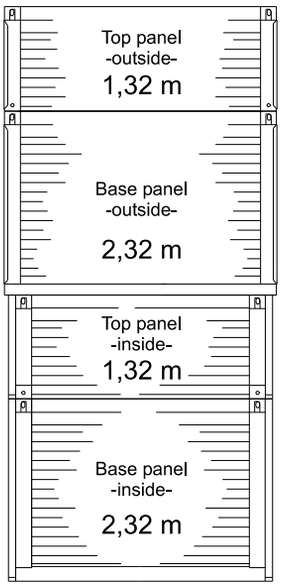
Combinations of height



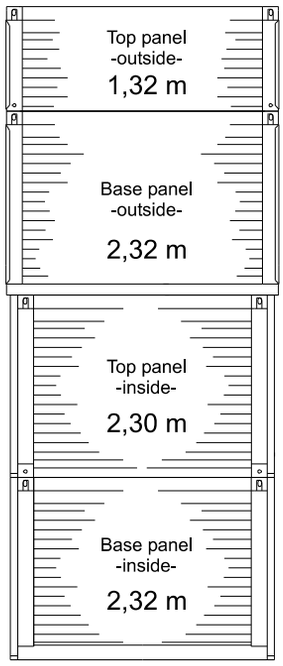
Trench depth ca. 4,60 m



Trench depth ca. 6,00 m



Trench depth ca. 7,30 m



Trench depth ca. 8,30 m

The shoring wall height can be adapted to the necessary trench depth with different panel combinations. Please note that, up to the maximum height, reduced shoring depths can be obtained by overlapping the inner and outer panels.

Extension bars for rectangular boogie car

Art. No.	Short description	l [m]	G [kg]
830 005	Extension bar HEB 220	**0,140**	38,0
830 010	Extension bar HEB 220	**0,275**	50,0
830 011	Extension bar HEB 220	**0,350**	55,0
830 012	Extension bar HEB 220	**0,375**	57,0
830 015	Extension bar HEB 220	**0,412**	60,0
830 020	Extension bar HEB 220	**0,550**	70,0
830 030	Extension bar HEB 220	**1,100**	110,0
830 075	Extension bar HEB 220	**1,650**	152,0
830 125	Extension bar HEB 220	**2,200**	192,0

Extension bars for U-type boogie car

Art. No.	Short description	l [m]	G [kg]
831 500	Extension bar HEA 450	**0,275**	95,0
831 510	Extension bar HEA 450	**0,550**	130,0
831 520	Extension bar HEA 450	**1,100**	207,0
831 530	Extension bar HEA 450	**1,650**	286,0
831 540	Extension bar HEA 450	**2,200**	362,0

Double slide rail system Linear shoring

Trench widths

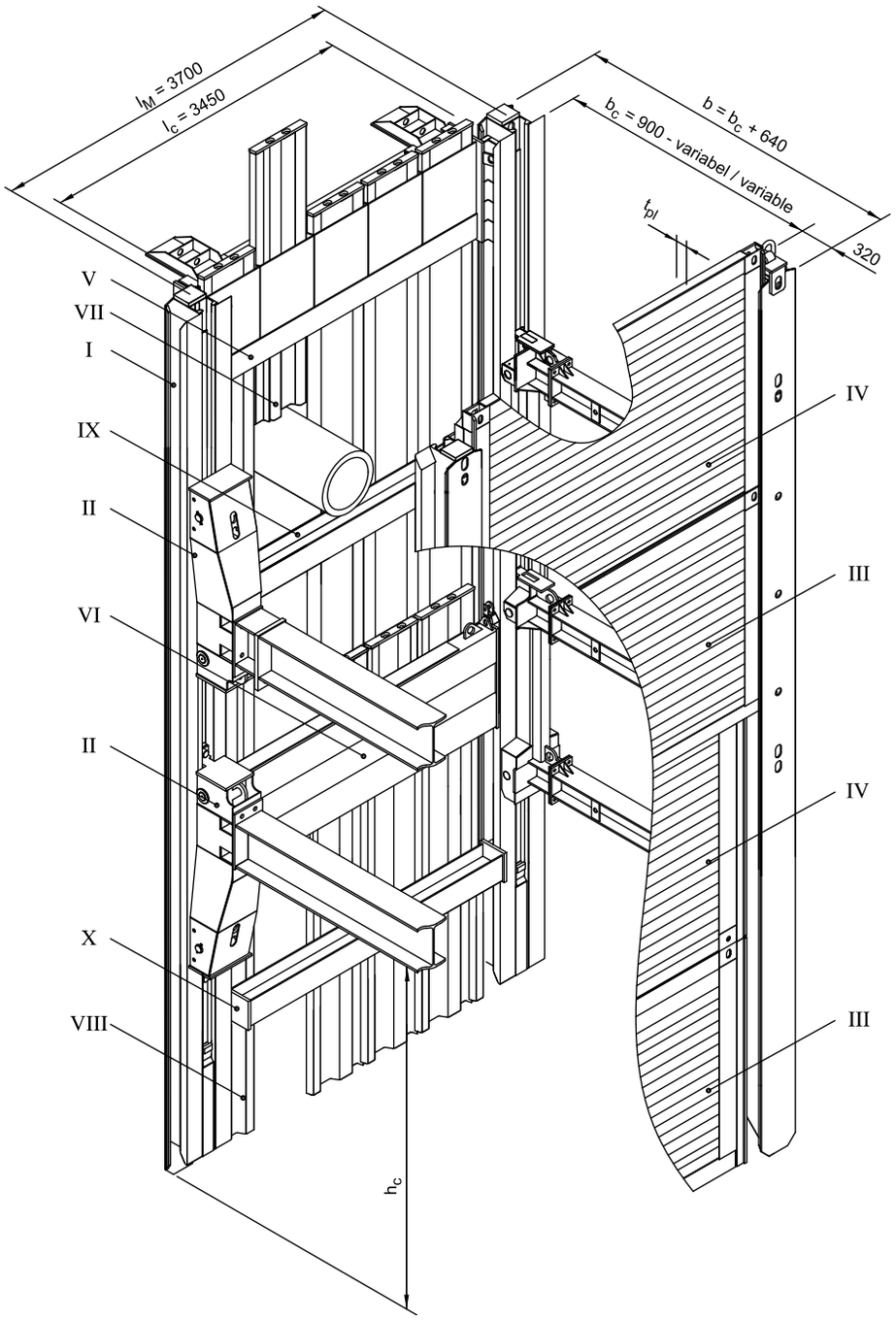
Length extension bar	b_c	b
[m]	[m]	[m]
0,000	0,900	1,540
0,140	1,040	1,680
0,275	1,175	1,815
0,350	1,250	1,890
0,375	1,275	1,915
0,412	1,312	1,952
0,550	1,450	2,090
1,100	2,000	2,640
1,650	2,550	3,190
2,200	3,100	3,740

Other trench widths possible by combining different extension bar lengths.
Larger trench widths available on request.

Accessories / Spares

Art. No.	Short description	l [m]	G [kg]	d [m]	Standard
842 753	**Adapter for DKU piling frame corner shoring**		94,0		
842 751	**Adapter for DKU piling frame EGS E+S**		75,5		
834 080	**Adapter for EGS / DGS (LV)**		105,0		
336 960	**Bearing claw**		40,0		
862 100	**Bolt (for connector)**	**0,110**	0,8	0,035	
832 230	**Bolt (for pressure plate)**	**0,150**	1,4	0,035	
410 510	**Bolt (for pull adapter DG)**	**0,285**	5,9	0,055	
410 520	**Bolt (for pull adapter EG)**	**0,170**	3,9	0,05	
832 245	**Bolt for boogie car**	**0,300**	3,2	0,04	
832 246	**Bolt for boogie car (Deep linear shoring)**	**0,300**	4,6	0,05	
862 200	**Connector**		6,9		
834 100	**Cover plate for in-situ concrete DG -base plate-**	**0,750**	7,9		
834 110	**Cover plate for in-situ concrete DG -top plate-**	**1,000**	9,9		
842 099	**DKU piling frame guide frame**	**2,27**	105,0		
842 100	**DKU piling frame guide frame**	**3,81**	175,0		
IA 0150F	**Nut M 24**		0,1		DIN 934
IA 0210F	**Nut M 36**		0,4		DIN 934
861 075	**Pressure beam E+S / Krings (GLS)**	**4,60**	425,0		
861 085	**Pressure beam E+S / Krings (GLS)**	**5,80**	525,0		
861 076	**Pressure beam E+S / Krings (GLS, Medium, Magnum shoring, KS 100)**	**1,60**	175,5		
861 074	**Pressure beam E+S / Krings (GLS, Medium, Magnum shoring, KS 100)**	**2,35**	236,0		
861 070	**Pressure beam E+S / Krings (GLS, Medium, Magnum shoring, KS 100)**	**2,80**	271,0		
861 071	**Pressure beam E+S / Krings (GLS, Medium, Magnum shoring, KS 100)**	**3,40**	318,0		
834 015	**Pressure plate for boogie car**		12,4		
834 060	**Pull adapter double slide rail**		43,6		
834 057	**Pull adapter single slide rail**		30,8		
IB 0470F	**Screw M 24 x 80**		0,4		DIN 933
IB 0614F	**Screw M 36 x 80**		1,0		DIN 933
HE 0050F	**Spring cotter 6 mm**		0,03	0,006	DIN 11024
HE 0060F	**Spring cotter 8 mm**		0,1	0,008	DIN 11024

Double slide rail innercity shoring



I	Linear shoring support	IX	Waling (outside belt)
II	Boogie car	X	Waling (inside belt)
III	Base panel	l_M	Module length
IV	Top panel	l_c	Pipe culvert length
V	Sheet pile element (outside belt)	b	Shoring / trench width
VI	Sheet pile element (inside belt)	b_c	Inner width
VII	Sheet piles (outside belt)	h_c	Pipe culvert height
VIII	Sheet piles (inside belt)	t_{pl}	Thickness

Overlapping inner-city linear shoring with U-type or rectangular roller unit

(All dimensions in mm. The details of length of pipe opening l_c refer to the rectangular roller unit.)

Double slide rail innercity shoring

Linear shoring support

Art. No.	**l [m]**	G [kg]
820 912	**5,13**	995,0
820 915	**6,13**	1.200,0
820 920	**7,13**	1.410,0
820 924	**8,13**	1.865,0
820 929	**9,13**	2.348,0

Linear shoring boogie car

Art. No.	Short description	l [m]	G [kg]
832 200	Linear shoring rectangular boogie car	2,00	420,0
832 215	Linear shoring rectangular boogie car	2,20	465,0
832 205	Linear shoring U-type boogie car	2,00	550,0

Sheet pile elements -outer belt- (height 1.00 m)

Art. No.	**l [m]**	l_M [m]	t_{pl} [m]	l_c [m]	G [kg]
820 980	**3,45**	3,70	0,30	3,45	1.330,0

Sheet pile elements -inner belt- (height 1.00 m)

Art. No.	**l [m]**	l_M [m]	t_{pl} [m]	l_c [m]	G [kg]
821 000	**3,34**	3,70	0,30	3,45	1.217,0

Base panel -outside- (Height 2,32 m)

Art. No.	**l [m]**	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]
821 320	**3,45**	3,70	0,11	3,45	805,0	8,00

Top panel -outside- (Height 1,32 m)

Art. No.	**l [m]**	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]
822 410	**3,45**	3,70	0,11	3,45	560,0	4,55

Base panel -inside- (Height 2,32 m)

Art. No.	**l [m]**	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]
821 255	**3,34**	3,70	0,11	3,45	785,0	7,75

Top panel -inside-

Art. No.	**l [m]**	l_M [m]	h [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]
822 140	**3,34**	3,70	1,32	0,11	3,45	550,0	4,41
822 145	**3,34**	3,70	2,30	0,11	3,45	795,0	7,68

Construction with beams -outside-

Art. No.	**l [m]**	l_M [m]	G [kg]
821 003	**3,46**	3,70	374,0

Construction with beams -inside-

Art. No.	**l [m]**	l_M [m]	G [kg]
821 002	**3,30**	3,70	254,0

The details of length of pipe opening l_c refer to the rectangular roller unit.

Double slide rail innercity shoring

Extension bars

see Double slide rail innercity linear shoring (page 10)

Trench widths

see Double slide rail innercity linear shoring (page 11)

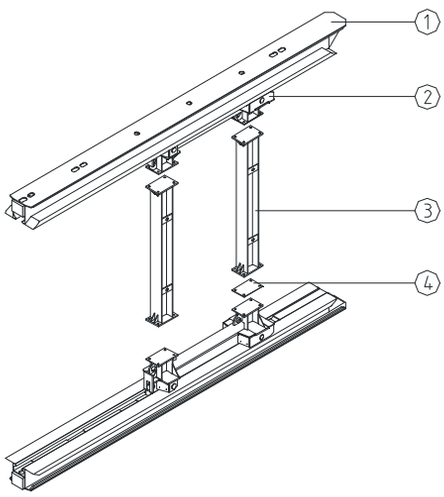
Accessories / Spares

see Double slide rail innercity linear shoring (page 11)

l	Length	A	Area
l_M	Module length	G	Weight
l_c	Pipe culvert length	G / VP	Weight per shoring panel
t_{pl}	Thickness		

Assembly instructions for the guide frame of overlapping linear shoring and overlapping inner-city linear shoring

1. System overview for the guide frame



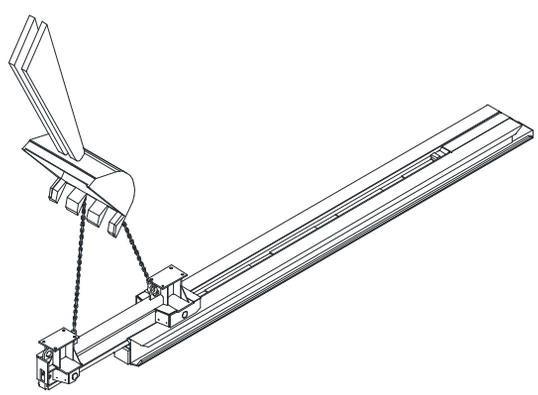
(1) Two linear shoring soldiers

(2) Two roller units

(3) Two spacer bars

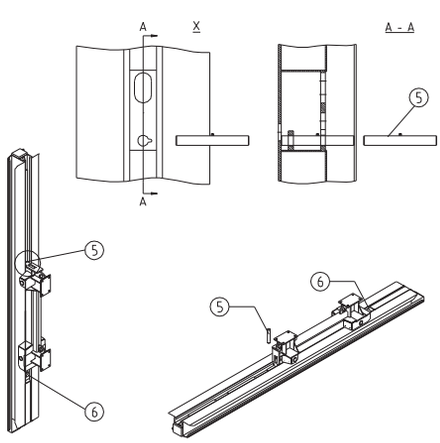
(4) One spacer plate

2. Fitting the roller units



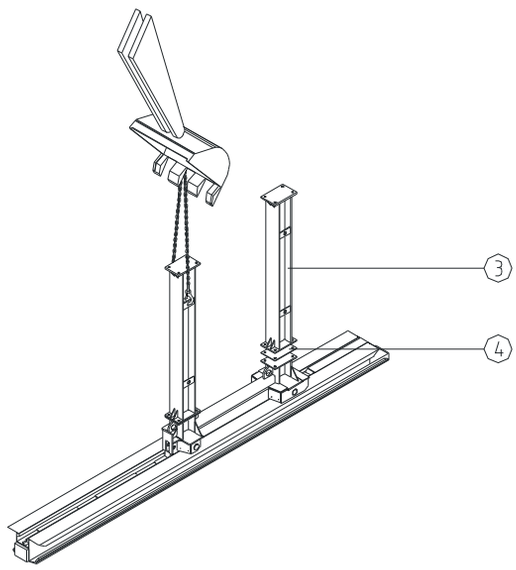
Using lifting gear and a suitable sling (GS-approved), slide a single roller unit, roller first, into the linear shoring soldiers.

3. Pinning the roller units



The roller units are secured in the linear shoring soldier by inserting a pin (5) into the envisaged hole (see detail X) at the upper end of the soldier, above the roller unit. After insertion, the pin must be turned through 180° to secure it. At the bottom end of the linear shoring soldier, a fixed stop limits the downward movement of the roller unit (6).

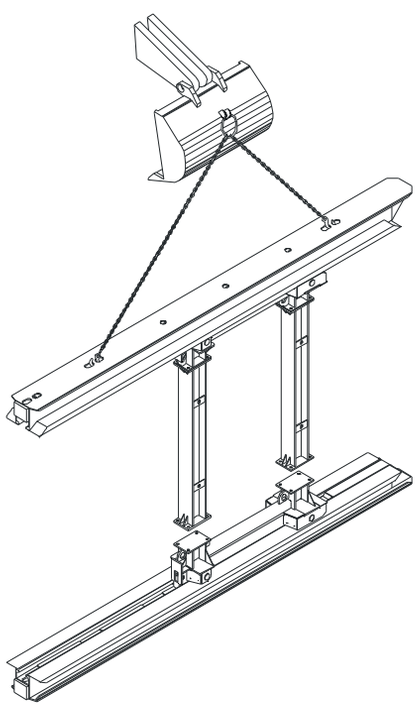
4. Fitting the spacer bars



The preassembled combinations of spacer bars (3) required for the desired trench width are aligned on the bolting plates of the roller units and bolted with the required number of bolts as per piece list. To facilitate alignment of the spacer bars during the next assembly step, the bolts are only loosely fastened.

Insert the spacer plate (4) between the bolting plate and the bottom spacer bar at the pointed end of the soldier.

5. Assembly of the complete guide frame



The linear shoring soldier prefitted with the roller units and spacer bars is pivoted over the second soldier so that the roller units and spacer bars can be bolted together.

After assembly, the guide frame is laid flat on the ground.

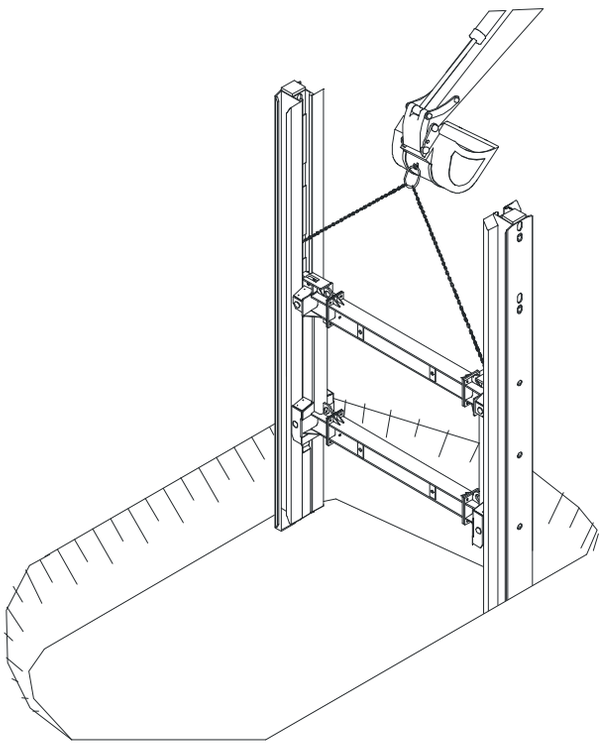
All screw joints must now be tightened firmly.

For large trench depths, the guide frame should be assembled flat on the ground. The two roller units inserted into the soldiers should be prefitted with spacer bars of about the same length. After prefitting, the two soldiers are laid on the ground facing one another so that the spacer bars can be bolted together.

To produce a shoring bay, two fully assembled guide frames are necessary. For each subsequent shoring bay, an additional guide frame must be provided. From a soldier length of 7.13 m, a second roller unit should be employed in order to ensure firm soldier guidance.

Installation instructions for overlapping linear shoring

1. Placing the first guide frame



After measurement of the trench line, the initial layer of soil is excavated for the first shoring unit in accordance with the project management's instructions.

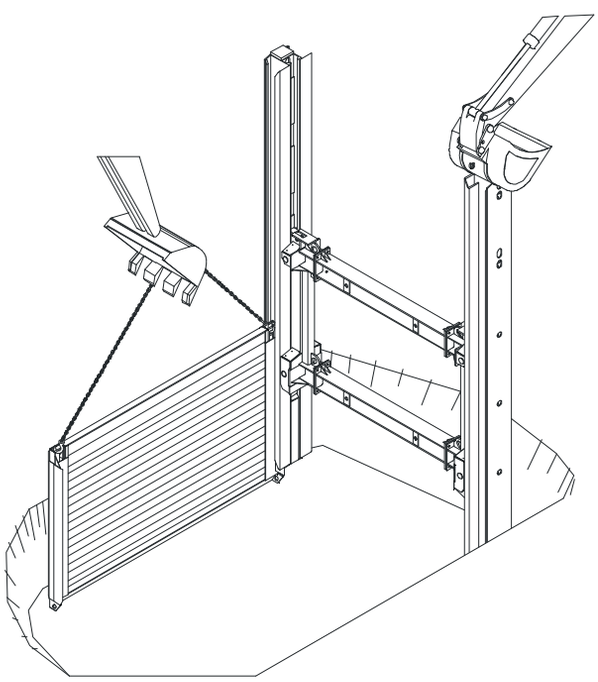
Width: Required clear trench width + approx. 0.7 m

Length: Module length + approx. 0.7 m (or panel length + approx. 1 m)

Using lifting gear and a suitable sling (GS-approved) attached to the sling attachment points of the linear shoring soldiers, place the first guide frame in the centre of the trench axis and at right angles to the trench line. The bottom end of the roller unit rests on the permanently welded stops and its upward motion is limited by a pin in the guide frame (see assembly instructions). If necessary, the frame can be locked plumb (e.g. with the aid of a second set of lifting gear).

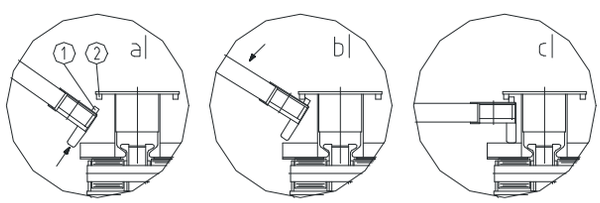
During placement, the guide frame should have an "A" shape (tapering upwards).

2. Inserting the outer base panels

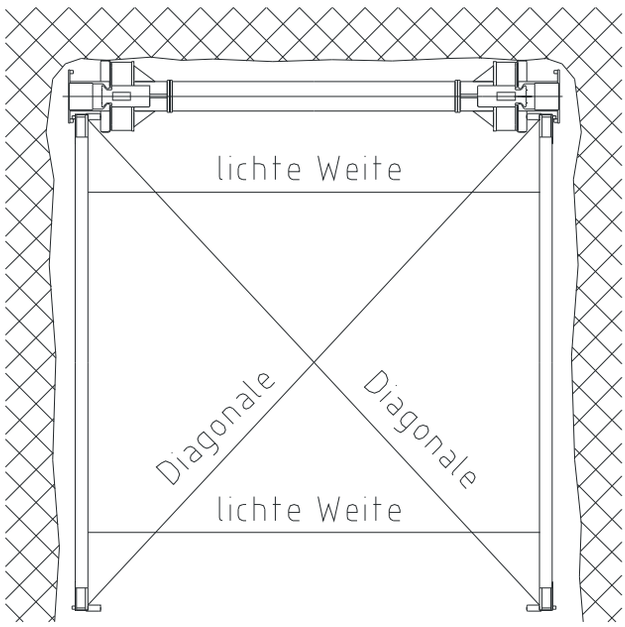


The outer base panels are pivoted with lifting gear into the soldier profile (see figures a, b and c). Make sure that the rectangular profile (1) on the reverse of the shoring panels catches behind the rectangular profile of the linear shoring soldiers (2). After pivoting, the shoring panels are lowered to the bottom of the trench.

Before lowering the linear shoring frame, always remove the bottom pin.



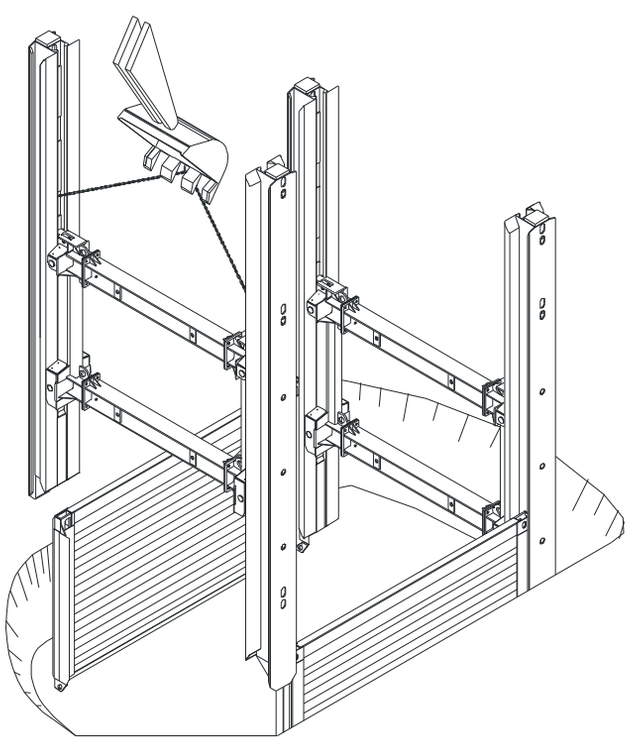
3. Aligning the shoring panels



The first shoring unit has to be precisely aligned so that the shoring runs parallel with the trench axis. It is important here that the horizontal clearance between the shoring panels is the same at both panel ends; and that the two diagonal axes of the shoring unit are the same length.

lichte Weite = Clear width
Diagonale = Diagonal

4. Placing the second guide frame

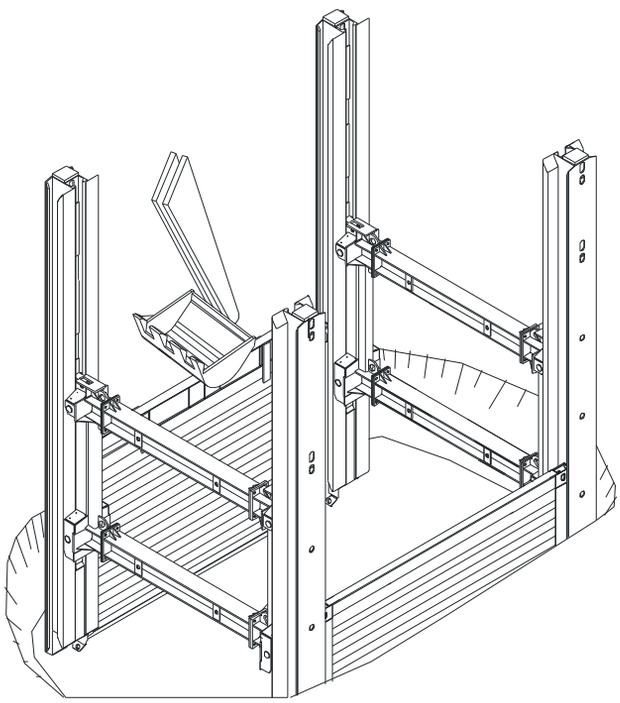


The second frame is guided over the exposed guide profiles of the base panels and pushed down to the bottom of the trench.

After placement, the shoring unit should again be aligned (as described in step 3) in order to facilitate the installation and removal of subsequent shoring units.

To ensure firm guidance of the shoring, the cavity between the trench wall and shoring panel must be backfilled with suitable material during the lowering process.

5. Lowering the shoring unit

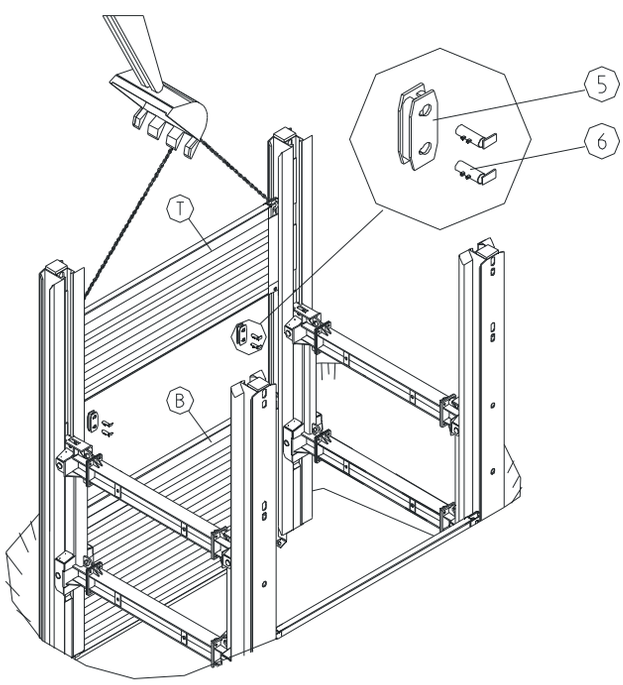


Before the lowering process proper, the soil beneath the shoring panels and soldiers is excavated in accordance with the project management's instructions. The soldiers, shoring panels and roller units are pressed down in turn, with special use being made of pressure beams for the shoring panels and pressure plates for the soldiers.

The shoring components must be pressed and on no account struck or hammered.

When lowering the system, make absolutely sure that the roller units are positioned vertically to provide the required structural strength (pay attention to length of cantilever).

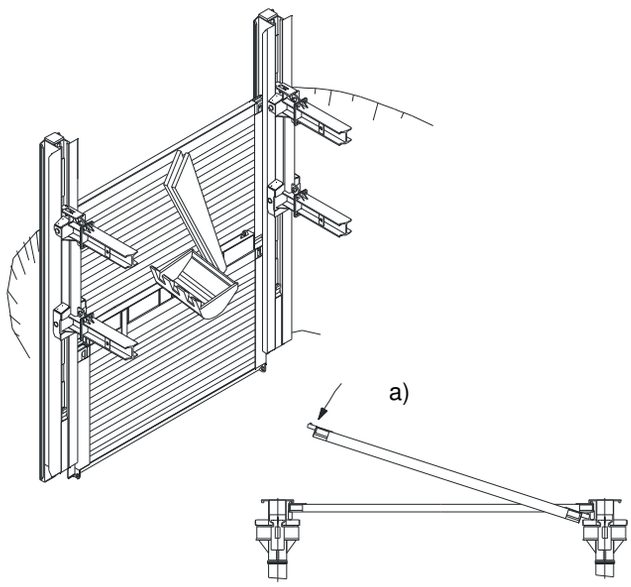
6. Inserting the outer top panels



Depending on the required trench depth, the outer top panels (T) are inserted in the soldier guides when the outer base panels (B) have been lowered to the provisional trench bottom.

The base and top panels must be joined together with connectors (5) and pins (6).

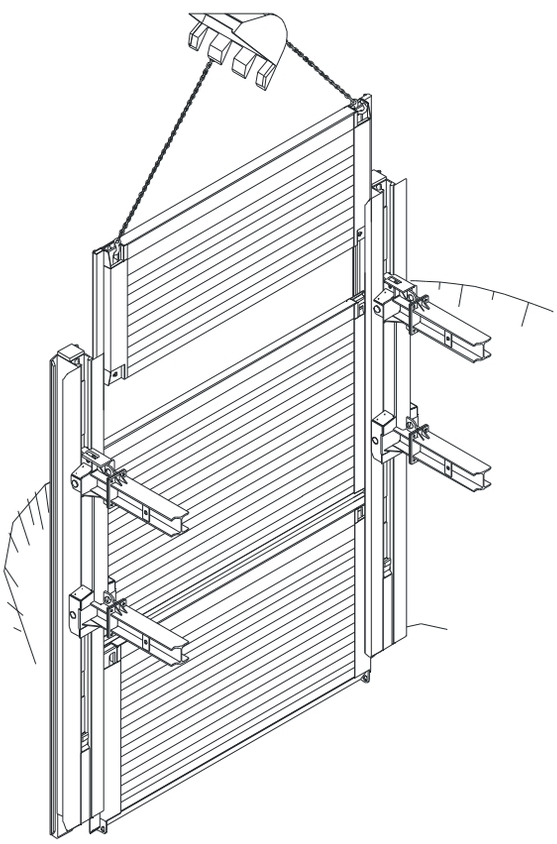
7. Inserting the inner base panels



As shown in figure a, the inner base panel is pivoted between the guide frames, guided in the U-shaped guide rails of the outer panels and lowered to the bottom of the trench. Trench excavation continues with the lowering of the inner base panels, guide frames and roller units.

When lowering the system, make absolutely sure that the roller units are positioned at half the installation depth. The static loading requirements for the length of cantilever must be observed.

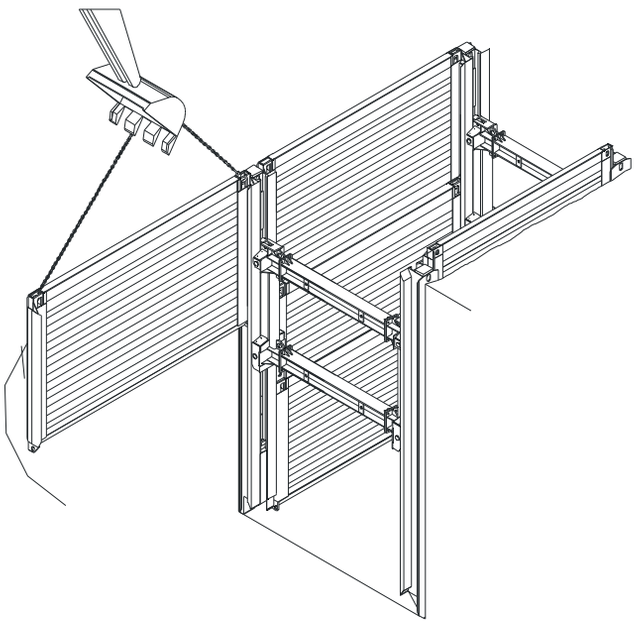
8. Inserting the inner top panels



In accordance with the instructions of step 6, further height adjustment of the wall of shoring can be achieved by inserting inner top panels (T).

The base and top panels must be joined together with connectors (5) and pins (6) (see figure in step 6).

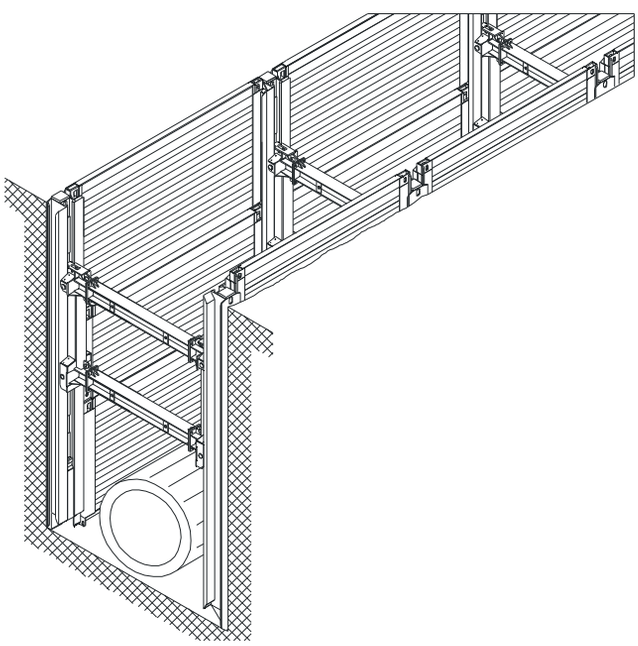
9. Installing the next shoring unit



The next shoring unit is installed as soon as the previous unit has been fully lowered to the bottom of the trench and the roller units are vertically positioned and fixed in order to provide the required structural strength. Installation is described in steps 1 to 8. Subsequent units are aligned with the precisely installed first unit. The clear trench width and length of diagonal (step 3) when inserting the shoring panels should be checked for each subsequent unit.

Before using the shoring elements in any way, all the threaded joints must be checked for tightness and tightened if necessary. This applies particularly to U-type roller units used with just a single bracing system.

10. Pipe laying

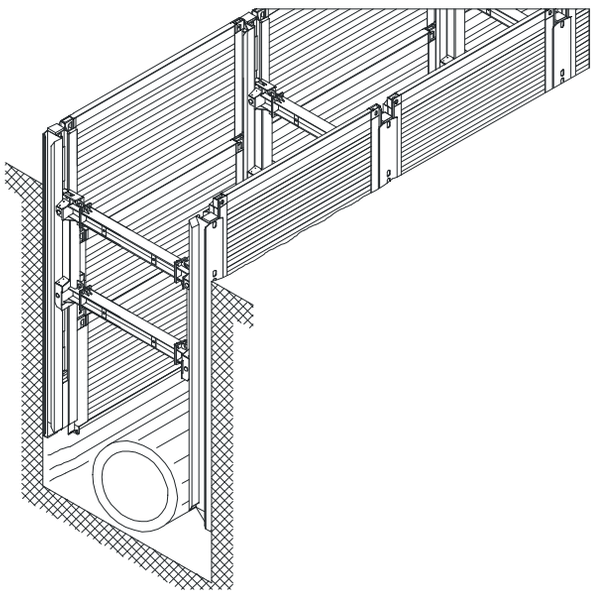


Once the complete desired train of shoring has been fully lowered to the bottom of the trench, pipe laying can start.

The roller units must be vertically positioned and fixed with pins in order to provide the required structural strength.

Instructions for removing overlapping linear shoring

Removal, backfilling and compacting



At the end of pipe-laying work, the shoring is removed with layer-by-layer backfilling and compacting. To this end, the shoring is extracted step-by-step in accordance with the instructions of the project manager on site and with the expert's specifications and the backfilling material returned to the trench is compacted against the existing soil.

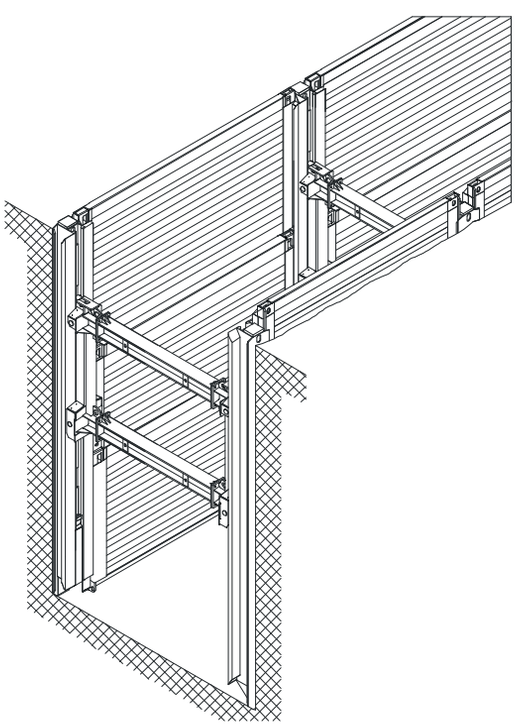
To extract the shoring, use a double-stranded chain at least 19 mm thick with a load-bearing capacity of 11.2 t at an angle of inclination of $\beta \leq 60°$. The lugs at the sling attachment points are dimensioned and designed for the chain's maximum permitted load.

Alternatively, to make removal of the shoring panels and soldiers easier, pulling adapters can be used. These can be obtained from Emunds+Staudinger GmbH.

Slings must only be attached to the envisaged holes.

Support for base of soldier/cast-in-place concrete

1. Inserting the shoring



When laying pipes of large diameter or building cast-in-place concrete drains/sewers, additional support for the guide frames at the base of the soldiers is often needed for reasons of stability.

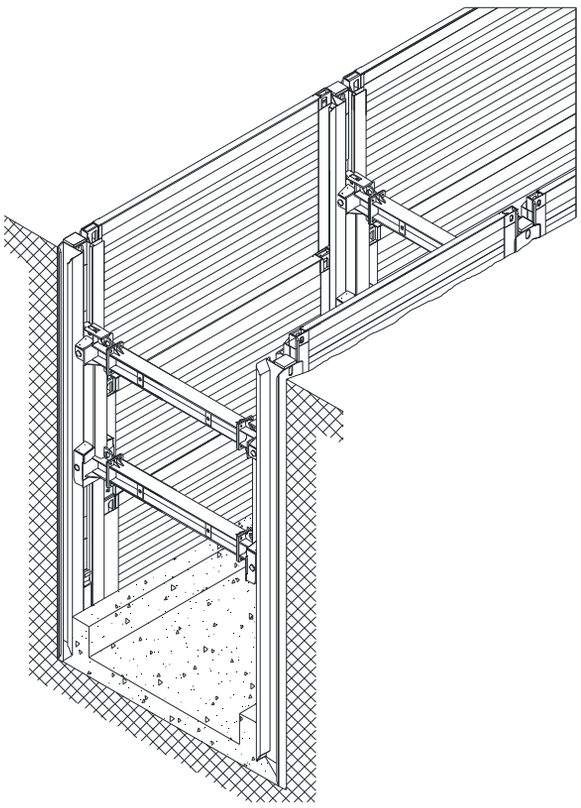
To this end, the shoring is initially installed in accordance with the installation instructions (*steps 1 to 10, "Installation instructions for overlapping linear shoring"*) and the bottom of the trench prepared in accordance with requirements.

Any support for the base of the soldiers depends on the calculations of structural strength and takes the form of a spar of steel or reinforced concrete. In the case of cast-in-place concrete drains/sewers, the bed carrying the drain/-sewer can be used as the support for the base of the soldier.

The support for the base of the soldier should have a contact surface sufficiently large for the soldier.

The support for the base of the soldier should provide the required structural strength. If the support is made of cast-in-place concrete, the setting time for the concrete should be taken into account.

2. Creating support for the base of the soldier



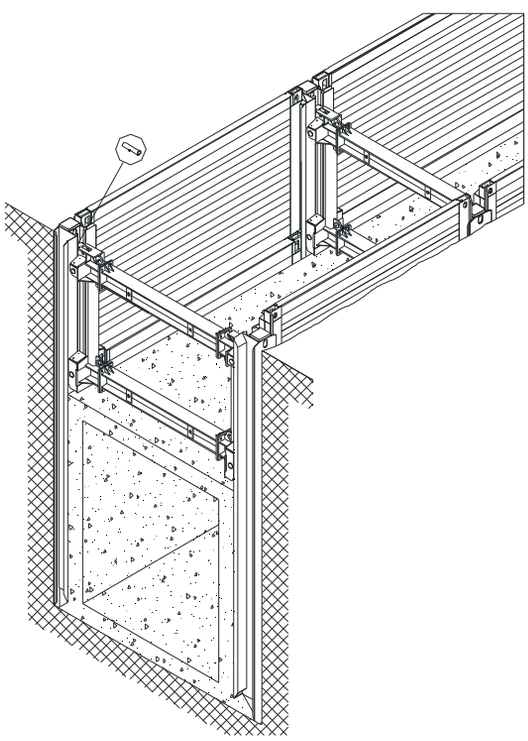
When support for the base of the soldier has been provided, the roller unit can be raised to the maximum permitted vertical pipe clearance for completion of the cast-in-place concrete structure. In this position, the roller unit must be secured with chains or pins.

During raising, the roller unit must always be prevented from sliding out of the top of the soldier (*for pin, see step 3 of "Assembly instructions for the guide frame"***).**

If the shoring is also to serve as formwork for a cast-in-place concrete structure, the open guides of the roller units in the soldiers must be sealed with sealing panels that can be obtained from Emunds+Staudinger. In this way, a continuous smooth surface is created together with the shoring panels. An intermediate layer (e.g. rigid foam panels, sheeting) must always be inserted between the shoring and the cast-in-place wall in order to ensure smooth removal.

The penetration of concrete or cement mortar between the steel shoring elements and in the vicinity of the connector-pin joints must be prevented at all costs.

3. Removing the shoring unit



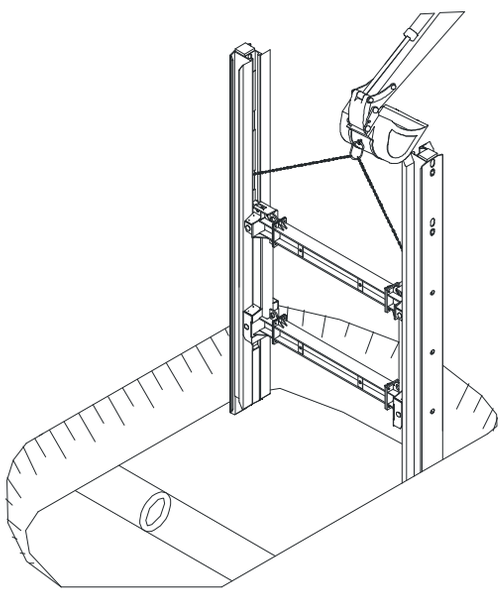
When the concrete walls have set, the shoring is removed in the way described in step 1 of these instructions. If the remaining cavity between the cast-in-place concrete and the soil has to be backfilled, it is essential to use shoring panels and soldiers with integrated injection holes through which a sand-water-cement mix or insulating material can be injected into the cavities. After injection and removal of the shoring, all the shoring elements and particularly the injection holes must be cleaned immediately.

Installation instructions for overlapping inner-city linear shoring

1. General remarks

For inner-city linear shoring, sheet piles are guided in inner and outer piling frame elements (inner and outer walers). To make allowance for pipelines/cables crossing the trench, particularly in densely built-up inner-city areas, openings are provided in the supported and secured trench walls.

2. Placing the first guide frame



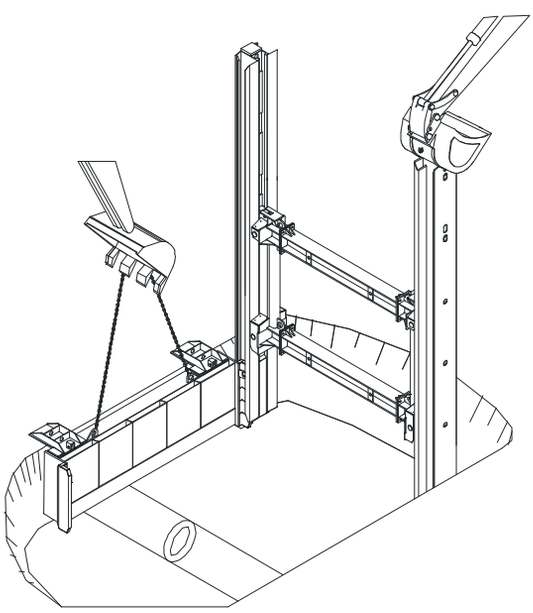
After measurement of the trench line, the initial layer of soil is excavated for the first shoring unit in accordance with the project management's instructions.

Width: Required clear trench width + approx. 0.7 m

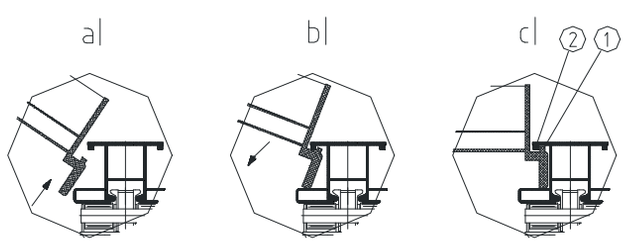
Length: Module length + approx. 0.5 m (or inner panel length + approx. 1 m)

Using lifting gear and suitable slings (GS-approved), the first guide frame is placed in the centre of the trench axis and at right angles to the trench line. The bottom end of the roller unit rests on the stops permanently welded on the linear shoring soldiers and its upward motion is limited by a pin in the guide frame (see assembly instructions). If necessary, the frame can be locked plumb (e.g. with the aid of a second set of lifting gear).

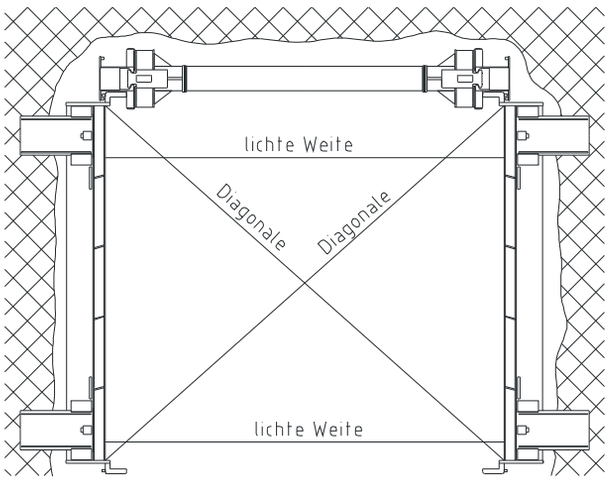
3. Inserting the outer walers



The outer walers are pivoted into the linear shoring soldier profile (see figures a, b and c). Make sure that the rectangular profile (1) on the reverse of the outer walers catches behind the rectangular profile of the linear shoring soldiers (2). When the support brackets have been fitted and pinned as holding points, the walers are lowered to the bottom of the trench. Before lowering the linear shoring frame, always remove the bottom pin.



4. Aligning the outer walers

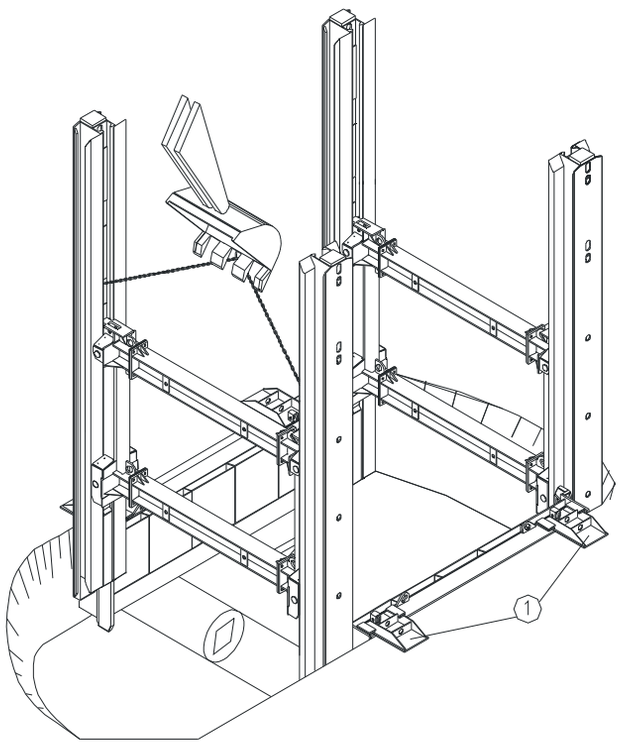


The first shoring unit has to be precisely aligned so that the shoring runs parallel with the trench axis.

It is important here that the horizontal clearance between the outer walers is the same at both panel ends; and that the two diagonal axes of the shoring unit are the same length.

lichte Weite = Clear width
Diagonale = Diagonal

5. Placing the second guide frame

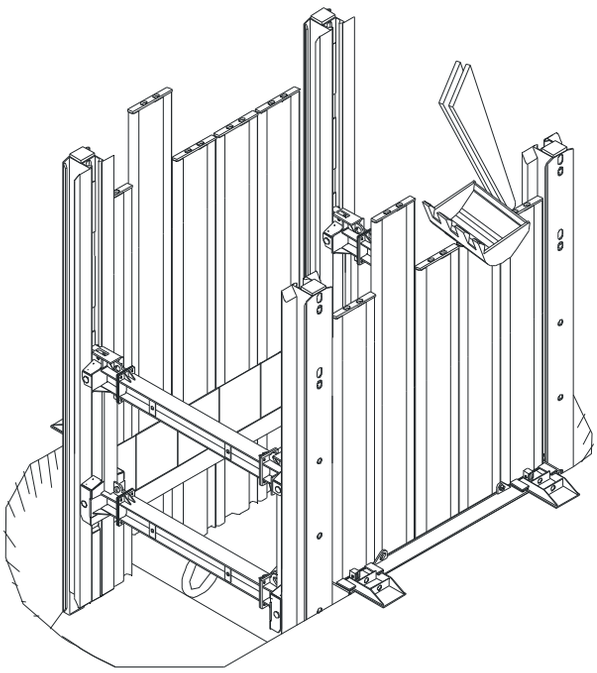


Using lifting gear, the second frame is guided over the exposed guide profiles of the outer walers and lowered to the bottom of the trench.

After placement, the shoring unit should be aligned again in order to facilitate the installation and removal of subsequent shoring units.

The cavity between the soil and outer walers must be backfilled and compacted.

6. Inserting the sheet piles

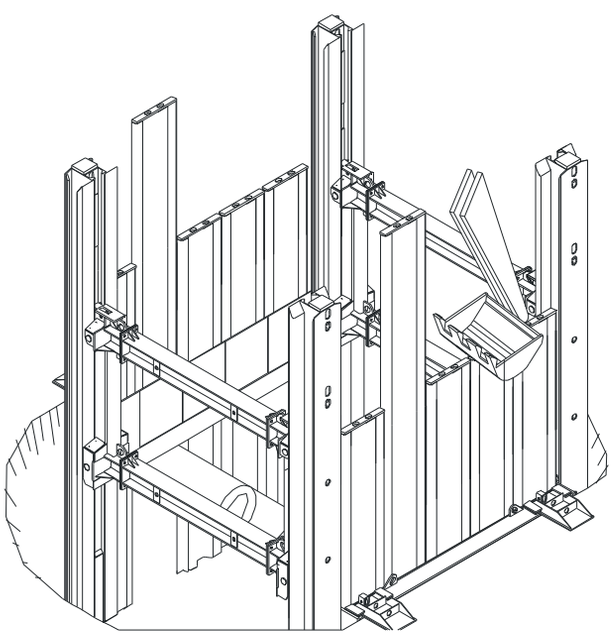


When the sheet piles have been inserted in the two opposite outer walers, further soil can be excavated beneath the linear shoring soldiers and sheet piles in accordance with the instructions of project management on site. The sheet piles and linear shoring soldiers are pushed or pressed down in turn. The shoring components must be pressed and on no account struck or hammered.

The outer walers remain fixed in their position.

When lowering the shoring system, make absolutely sure that the roller units are positioned vertically to provide the required structural strength (pay attention to length of cantilever).

7. Lowering the shoring unit

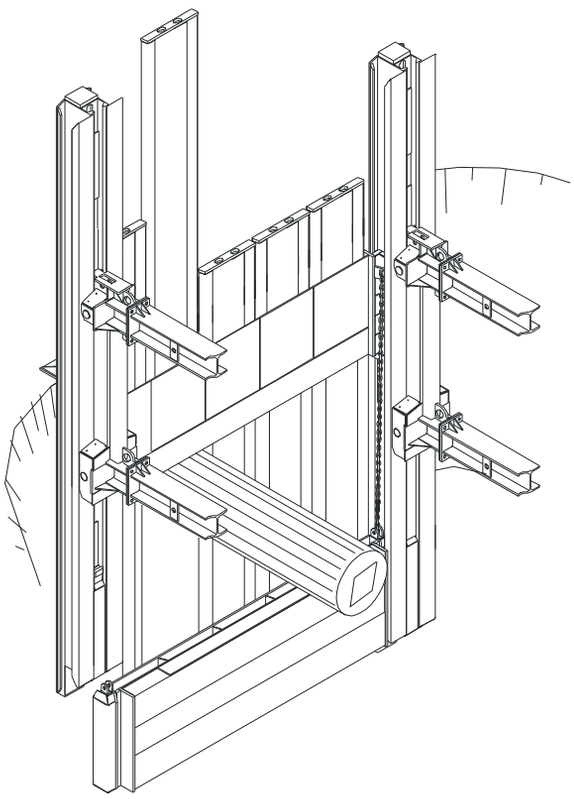


Further soil is excavated and the sheet piles and guide frames are now pressed down in turn. The outer walers remain in a fixed position and are held by the support brackets (1).

The soil beneath the linear shoring soldiers is excavated in accordance with the project management's instructions before the shoring unit is lowered.

When lowering the shoring system, the maximum permitted soldier cantilever lengths must be observed.

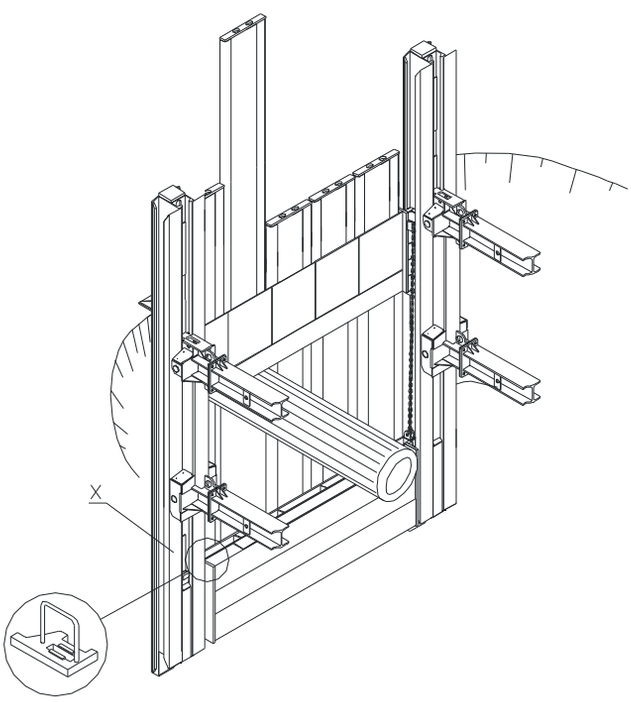
8. Inserting the inner walers



After exposure of the pipeline/cable crossing the trench, the inner walers must be attached on either side of the shoring in order to provide the required structural strength. One end of the inner walers is pushed into the open guide of a linear shoring soldier. The pair of linear shoring soldiers at the other end of the walers must not be lowered to the bottom of the trench (see adjacent figure). Only at the next stage (*step 9*) is this pair of linear shoring soldiers pushed via the guide of the inner walers resting on the bottom of the trench.

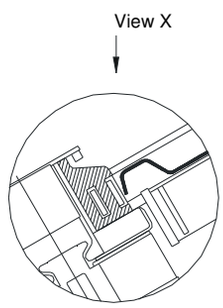
The fitting of the inner walers reduces the cantilever length of the outer sheet piles and prevents the sheet piles being inwardly deflected into the trench.

9. Pressing the pair of soldiers

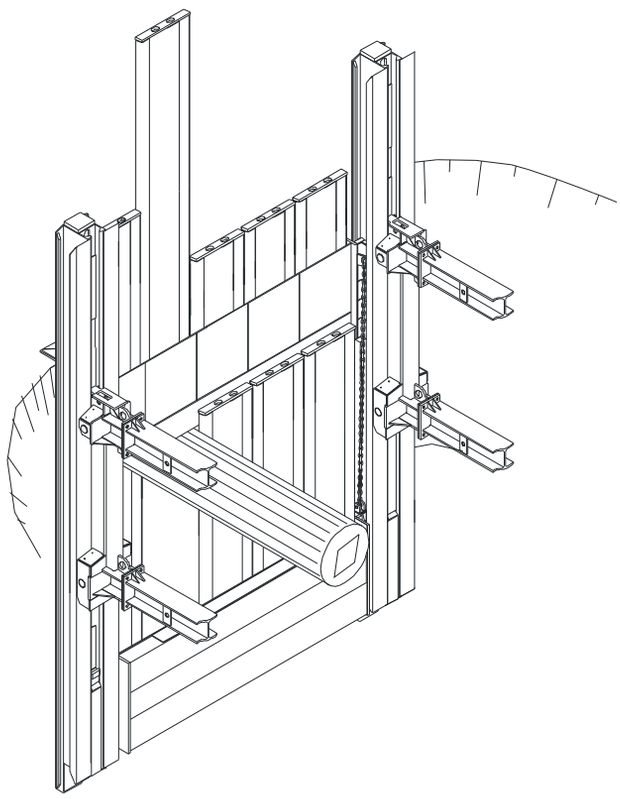


When the guide frame has been lowered, both ends of the inner waler rest in the guides of the linear shoring soldiers. The inner waler must be locked in this position with chains. The chains engage with the lugs on the front face of the outer waler and on the top face of the inner waler. With the aid of the shortening hook, the chain can be shortened so that the waler is positioned at the desired height. It must then be locked (view X) on the right and left and pinned.

The sheet piles guided in the outer waler are only then pressed into the soil. Make sure that there is a tight connection between the inner waler and sheet piles.



10. Inserting the inner sheet piles and lowering to the final depth

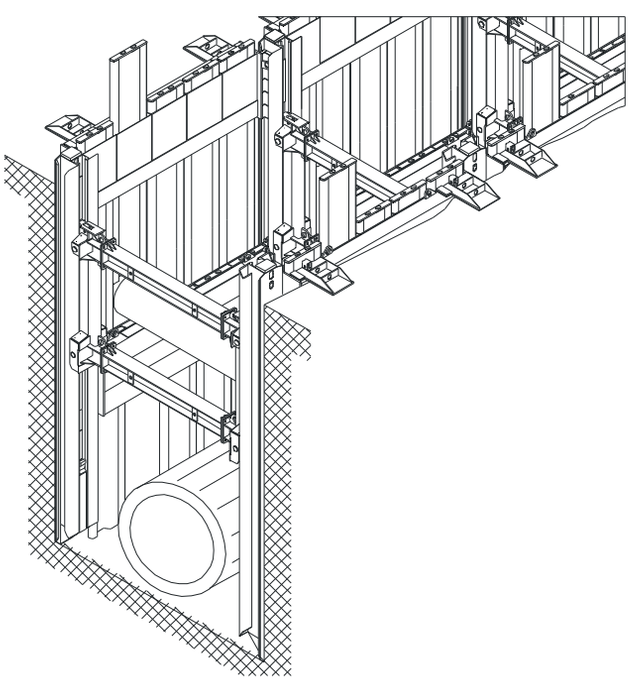


The sheet piles are now inserted in the guide slots of the inner walers.

With further soil excavation, the shoring is lowered to its final depth solely by pressing the sheet piles guided in the inner waler. The sheet piles' maximum permitted cantilever lengths must conform to the calculations of structural strength. To reduce the cantilever lengths, additional waler beams can be used for the inner and outer walers.

The next shoring unit is installed as soon as the previous unit has been fully lowered to the bottom of the trench and the roller units are vertically positioned and fixed in order to provide the required structural strength. Installation is described in *steps 1 to 10*. Subsequent units are aligned with the precisely installed first unit. The clear trench width and length of diagonal (*step 4*) when installing the shoring should be checked for each subsequent unit.

11. Pipe laying

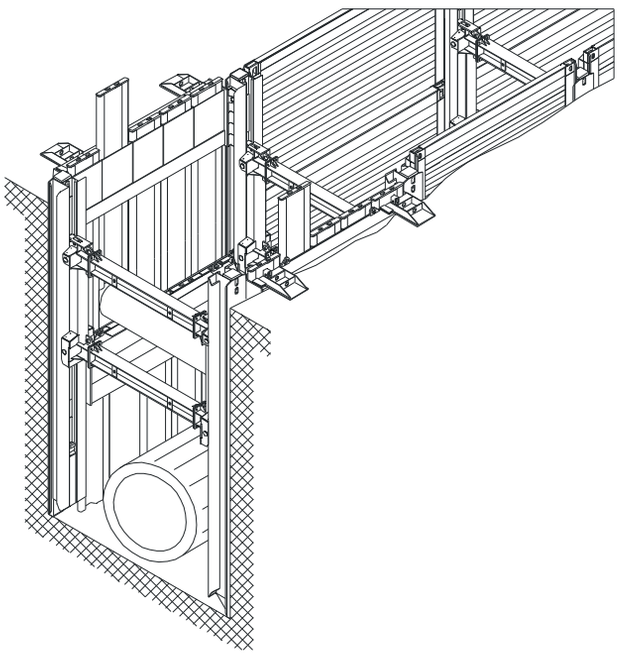


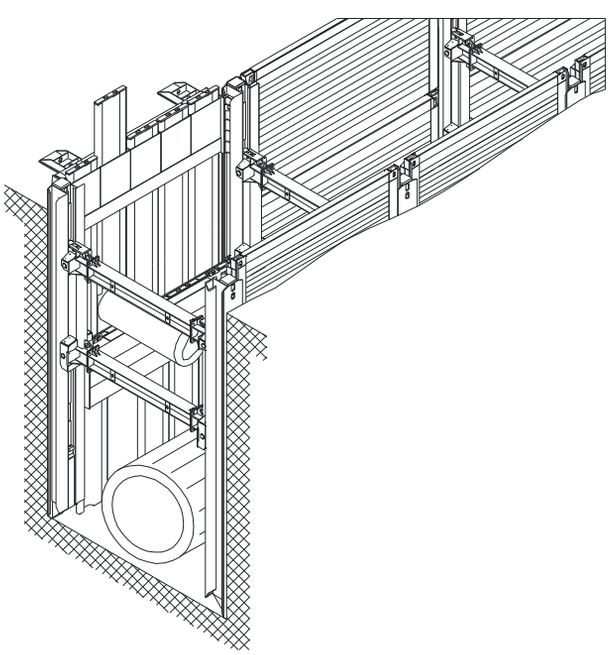
Once the complete desired train of shoring has been fully lowered to the bottom of the trench, pipe laying can start.

The roller units must be vertically positioned and fixed with pins or chains in order to provide the required structural strength.

For removal, see *"Instructions for removing overlapping linear shoring"*.

12. Installation examples





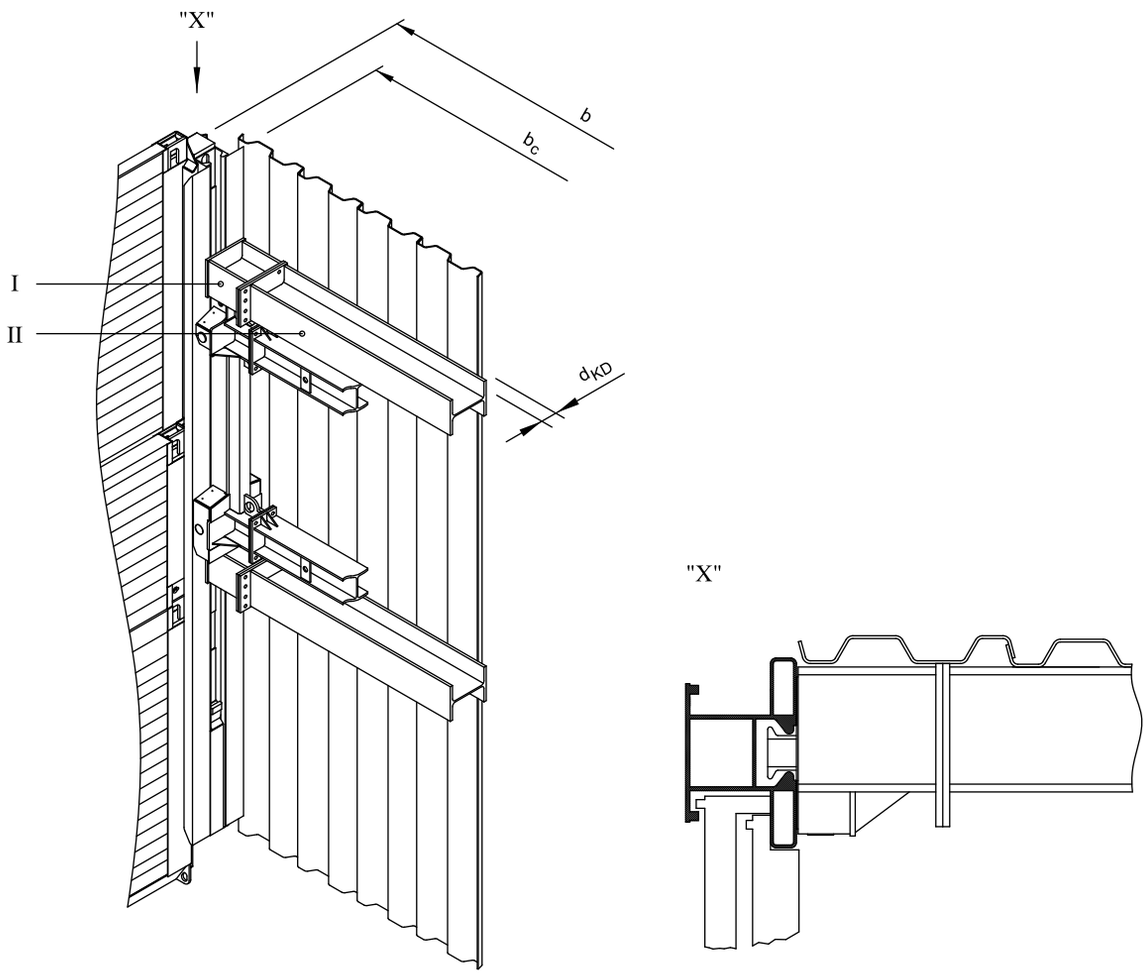
There is no problem combining overlapping linear shoring with overlapping inner-city linear shoring.

If, for example, service lines end in the middle of the trench, it may be more cost-effective to use GLS large-area shoring panels on the opposite side of the trench and only use sheet piling elements and sheet piles on one side (see figure below).

Technical data sheet trench-end shoring

Head shoring with sheet piles

Head shoring with sheet piles



I	Adapter for head shoring	b_c	Inner width
II	Extension bar	d_{KD}	Thickness sheet pile
b	Shoring / trench width		

Head shoring with sheet piles

(All dimensions in mm)

Head shoring with sheet piles

Adapter for head shoring

Art. No.	l [m]	G [kg]
899 994	**0,45**	132,0

Extension bars

Art. No.	Short description	l [m]	b_c [m]	G [kg]
830 800	Extension bar HEA 360	**0,550**	1,450	114,0
830 810	Extension bar HEA 360	**1,650**	2,550	240,0
830 830	Extension bar HEA 360	**2,200**	3,100	304,0
830 833	Extension bar HEA 360	**2,475**	3,375	340,0
830 835	Extension bar HEA 360	**3,100**	4,000	412,0
830 834	Extension bar HEA 360	**3,162**	4,062	420,0
830 836	Extension bar HEA 360	**3,300**	4,200	436,0
830 837	Extension bar HEA 360	**3,400**	4,300	447,0
830 840	Extension bar HEA 360	**3,575**	4,475	468,0
830 843	Extension bar HEA 360	**3,715**	4,615	485,0
830 845	Extension bar HEA 360	**3,850**	4,750	500,0
830 850	Extension bar HEA 360	**4,400**	5,300	561,0
830 855	Extension bar HEA 360	**4,950**	5,850	626,0
830 857	Extension bar HEA 360	**5,500**	6,400	693,0
830 860	Extension bar HEA 360	**6,050**	6,950	758,0
830 880	Extension bar HEA 360	**7,700**	8,600	948,0

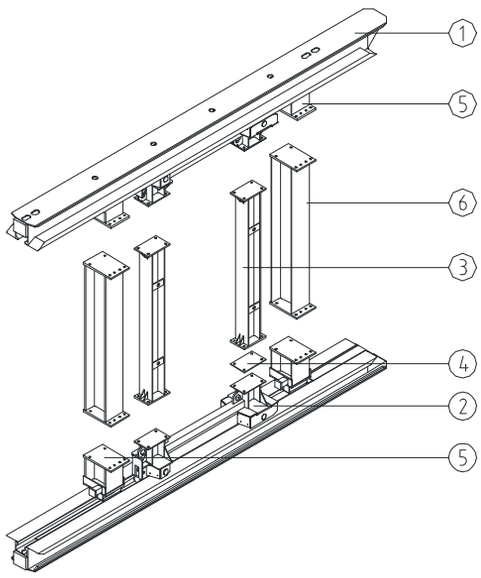
Accessories / Spares

see Double slide rail innercity linear shoring (page 11)

l	Length	b_c	Inner width
b	Shoring / trench width	G	Weight

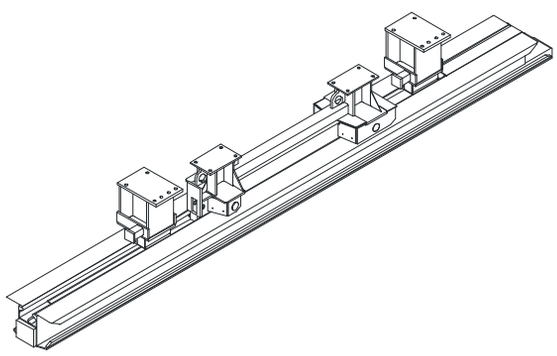
Assembly instructions for the guide frame for trench-end shoring

1. System overview for the guide frame



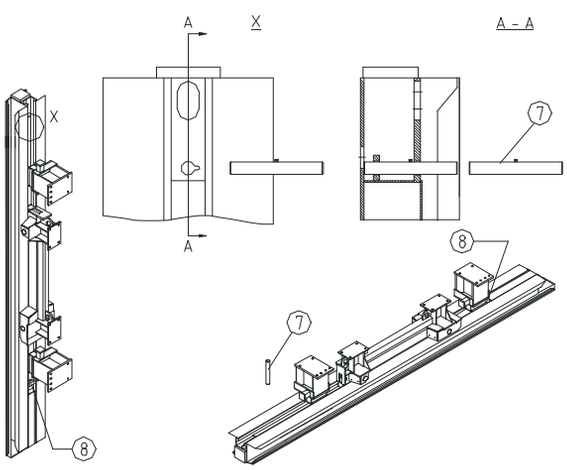
1) Two linear shoring soldiers
2) Two roller units (with compensating roller)
3) Two combinations of spacer bars
4) One spacer plate
5) Four adapters for trench-end shoring
6) Two spacer bars for trench-end shoring

2. Fitting the roller units



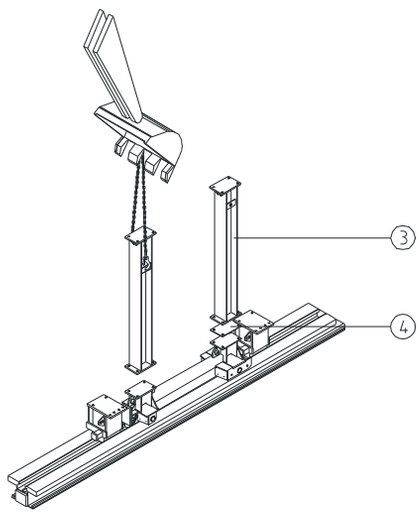
First of all, slide an adapter for trench-end shoring into each linear shoring soldier. So that the sheet piles are gripped tightly, the adapters must all point in the same direction. Then use lifting gear to slide in the roller unit, roller first, before introducing the second adapter for trench-end shoring.

3. Pinning the roller units



The roller units are secured in the linear shoring soldier by inserting a pin (7) into the envisaged hole (see detail X) at the upper end of the soldier, above the roller unit. After insertion, the pin must be turned through 180° to secure it. At the bottom end of the linear shoring soldier, a fixed stop limits the downward movement of the roller unit (8).

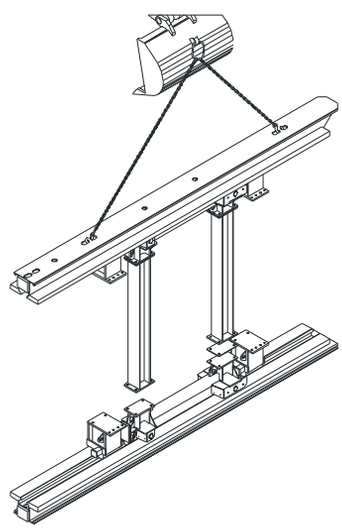
4. Fitting the spacer bars



The pre-assembled combinations of spacer bars (3) required for the desired trench width are aligned with the bolting plates of the roller units and bolted with the required number of bolts as per piece list. To facilitate alignment of the spacer bars during the next assembly step, the bolts are only loosely fastened.

Insert the spacer plate (4) between the bolting plate and the bottom spacer bar at the pointed end of the soldier.

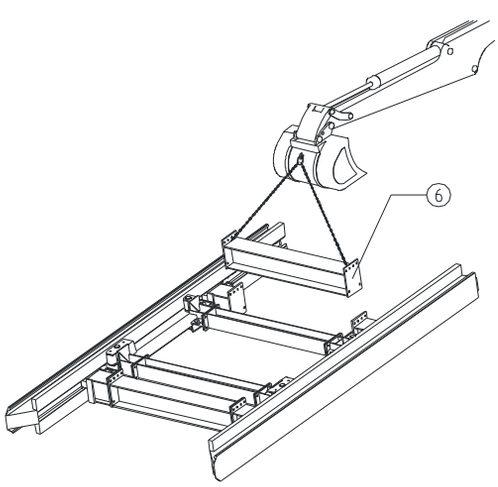
5. Assembly of the complete guide frame



The linear shoring soldier prefitted with the roller units and spacer bars is pivoted over the second soldier so that the roller units and spacer bars can be bolted together.

After assembly, the guide frame is laid flat on the ground.

6. Fitting the trench-end spacer bars



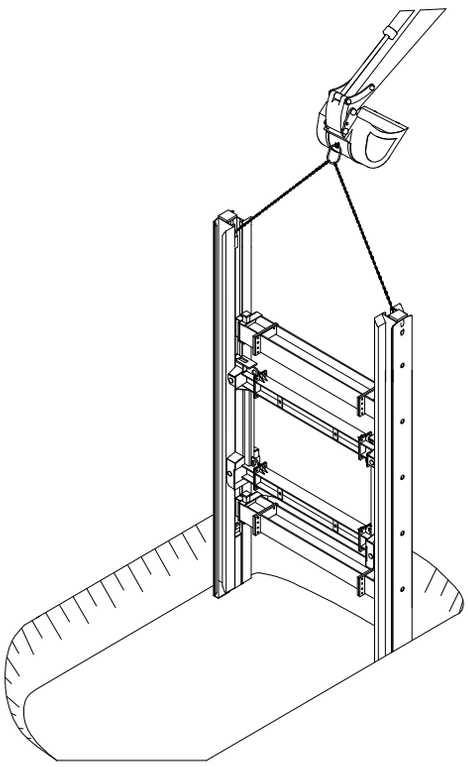
Unlike the combinations of spacer bars for the roller units, the trench-end spacer bars (6) are always single items. They are bolted to the adapters with the frame in a horizontal position lying on the ground.

To create a shoring unit with trench-end shoring, two fully assembled guide frames are required. An additional guide frame is required for every further shoring unit.

All screw joints must now be tightened firmly.

Installation instructions for trench-end shoring

1. Placing the first guide frame



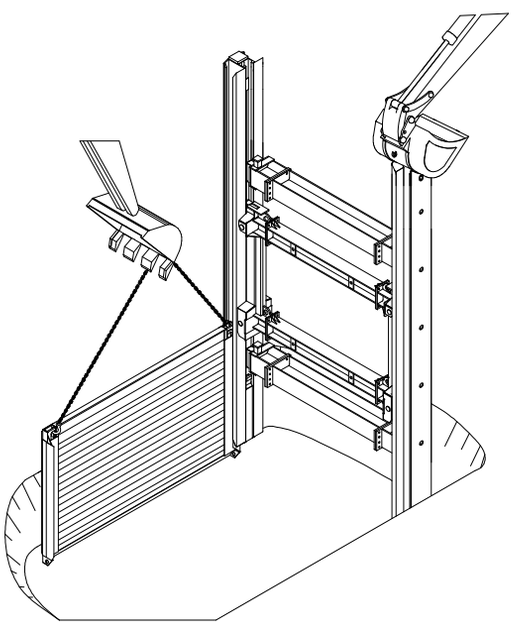
After measurement of the trench line, the initial layer of soil is excavated for the first shoring unit in accordance with the project management's instructions.

Width: Required clear trench width + approx. 0.7 m

Length: Module length + approx. 0.7 m (or panel length + approx. 1 m)

Using lifting gear and a suitable sling (GS-approved), the first guide frame is placed in the centre of the trench axis and at right angles to the trench line. The bottom end of the roller unit with adapters for trench-end shoring rests on the permanently welded stops and its upward motion is limited by a pin in the guide frame (see assembly instructions). If necessary, the frame can be locked plumb (e.g. with the aid of a second set of lifting gear).

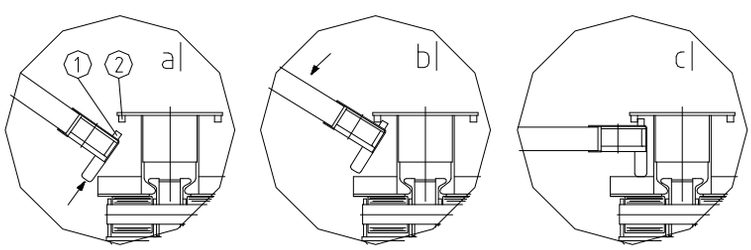
2. Inserting the outer base panels



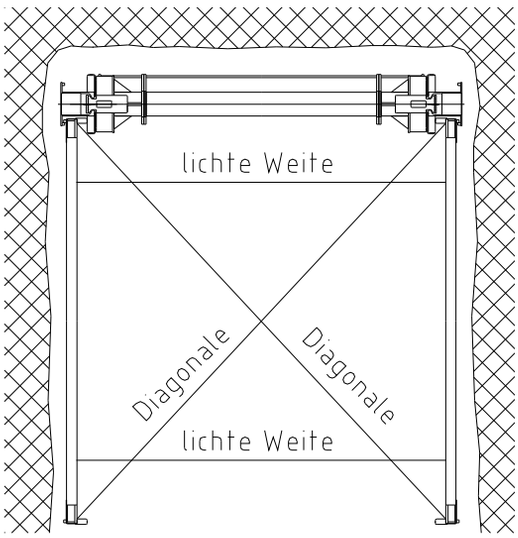
The outer base panels are pivoted with lifting gear into the soldier profile (see figures a, b and c). Make sure that the rectangular profile (1) on the reverse of the shoring panels catches behind the rectangular profile of the linear shoring soldiers (2).

After pivoting, the shoring panels are lowered to the bottom of the trench.

Before lowering the linear shoring frame, always remove the bottom pin.



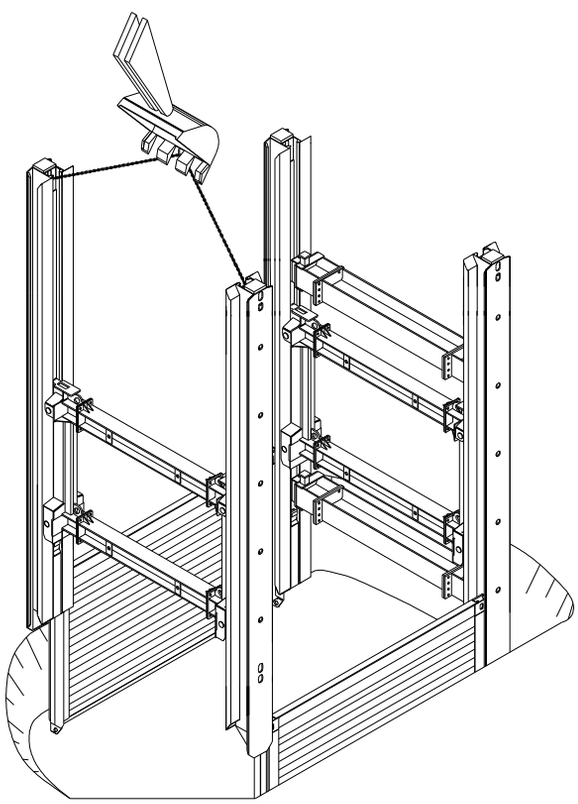
3. Aligning the shoring panels



The first shoring unit has to be precisely aligned so that the shoring runs parallel with the trench axis. It is important here that the horizontal clearance between the shoring panels is the same at both panel ends; and that the two diagonal axes of the shoring unit are the same length.

lichte Weite = Clear width
Diagonale = Diagonal

4. Placing the second guide frame

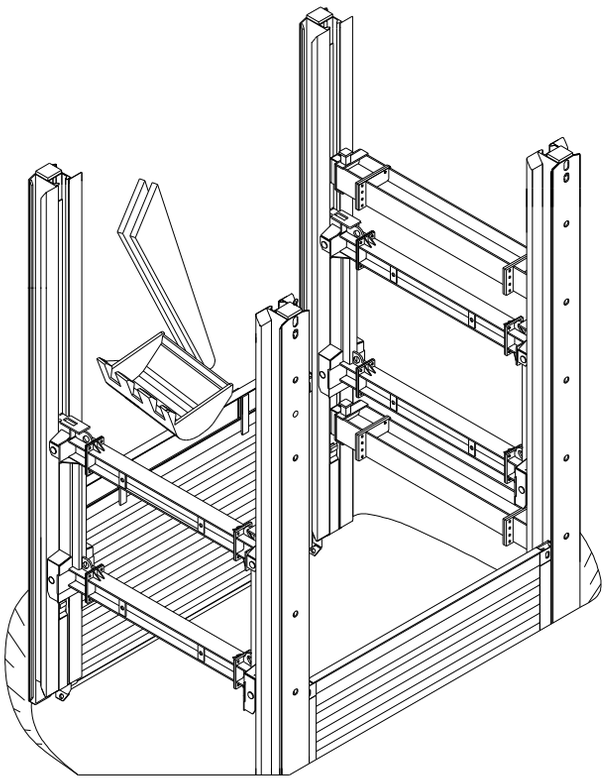


The second frame is guided over the exposed guide profiles of the base panels and pushed down to the bottom of the trench.

After placement, the shoring unit should again be aligned (as described in step 3) in order to facilitate the installation and removal of subsequent shoring units.

The cavity between the soil and shoring panel must be backfilled and compacted

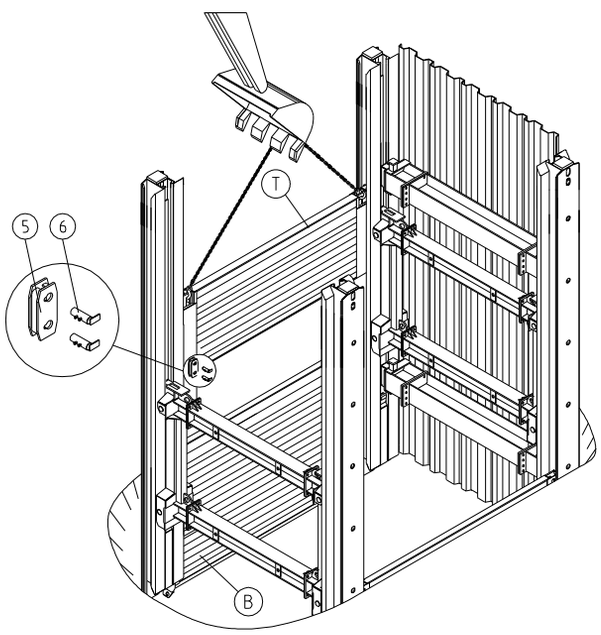
5. Lowering the shoring unit and fitting the top trench-end soldier



Before the lowering process proper, the soil beneath the shoring panels is excavated in accordance with the project management's instructions. The soldiers, shoring panels and roller units are pressed down in turn, with special use being made of pressure beams for the shoring panels and pressure plates for the soldiers. **The shoring components must be pressed and on no account struck or hammered.**

When lowering the system, make absolutely sure that the roller units are positioned vertically to provide the required structural strength (pay attention to length of cantilever).

6. Inserting the outer top panels and sheet piles



Depending on the required trench depth, the outer top panels (T) are inserted in the soldier guides when the outer base panels (B) have been lowered to the provisional trench bottom.

The base and top panels must be joined together with connectors (5) and pins (6).

The sheet piles are positioned at the end of the trench and lowered. Here, again, the lengths of cantilever must be complied with.

7. Inserting the inner base panels

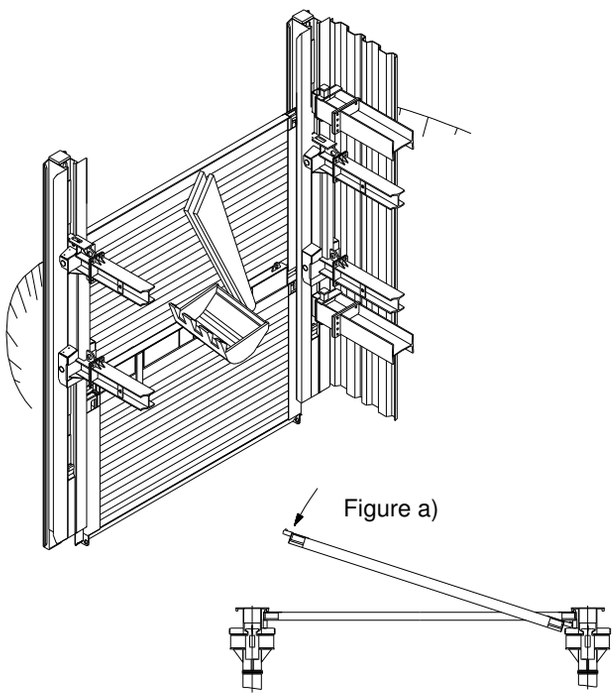
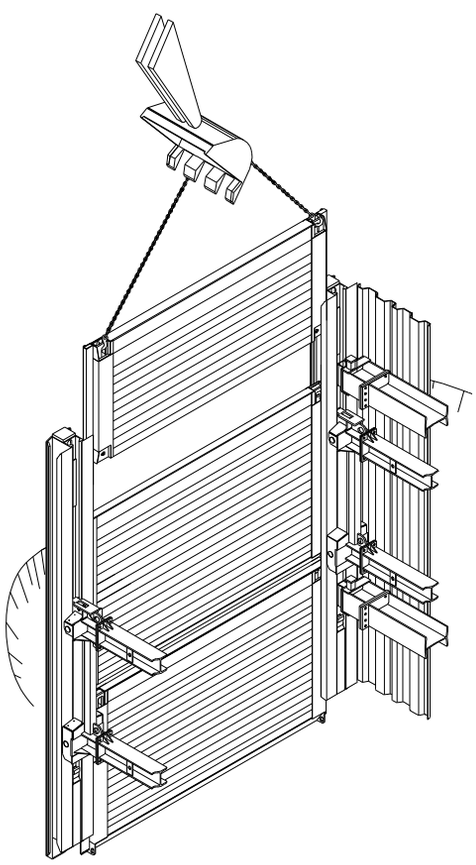


Figure a)

As shown in figure a, the inner base panel is pivoted between the guide frames, guided in the U-shaped guide rails of the outer panels and lowered to the bottom of the trench. Trench excavation continues with the lowering of the inner base panels, guide frames and roller units.

When lowering the system, make absolutely sure that the roller units are positioned vertically to provide the required structural strength (pay attention to length of cantilever).

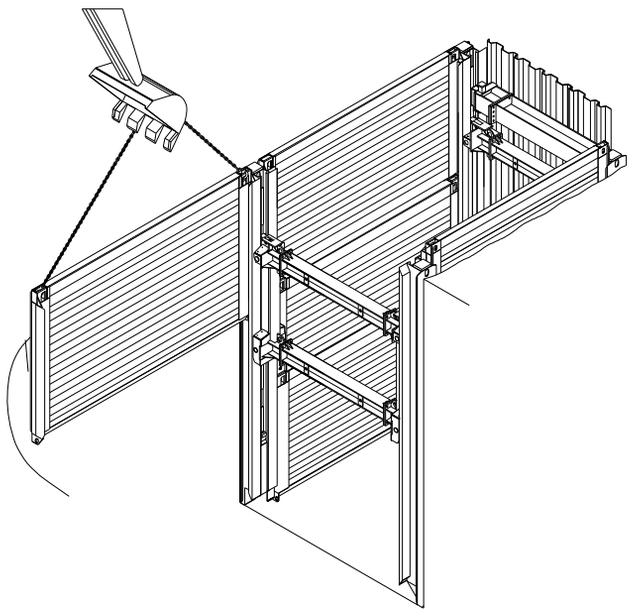
8. Inserting the inner top panels



In accordance with the instructions of step 6, further height adjustment of the wall of shoring can be achieved by inserting inner top panels (T).

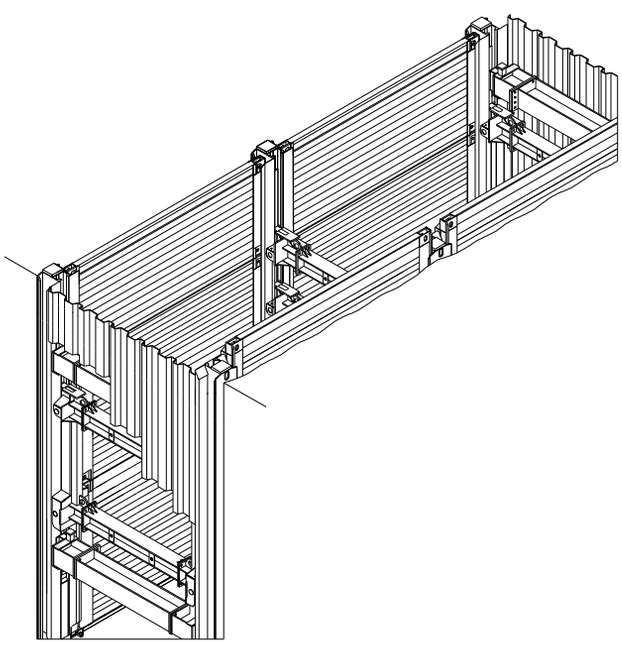
The base and top panels must be joined together with connectors (5) and pins (6) *(see figure in step 6)*.

9. Installing the next shoring unit and second trench-end shoring



The next shoring unit is installed as soon as the previous unit has been fully lowered to the bottom of the trench and the roller units are vertically positioned and fixed in order to provide the required structural strength. *Installation is described in steps 1 to 8*. Subsequent units are aligned with the precisely installed first unit. The clear trench width and length of diagonal *(step 3)* when inserting the shoring panels should be checked for each subsequent unit.

10. Pipe laying



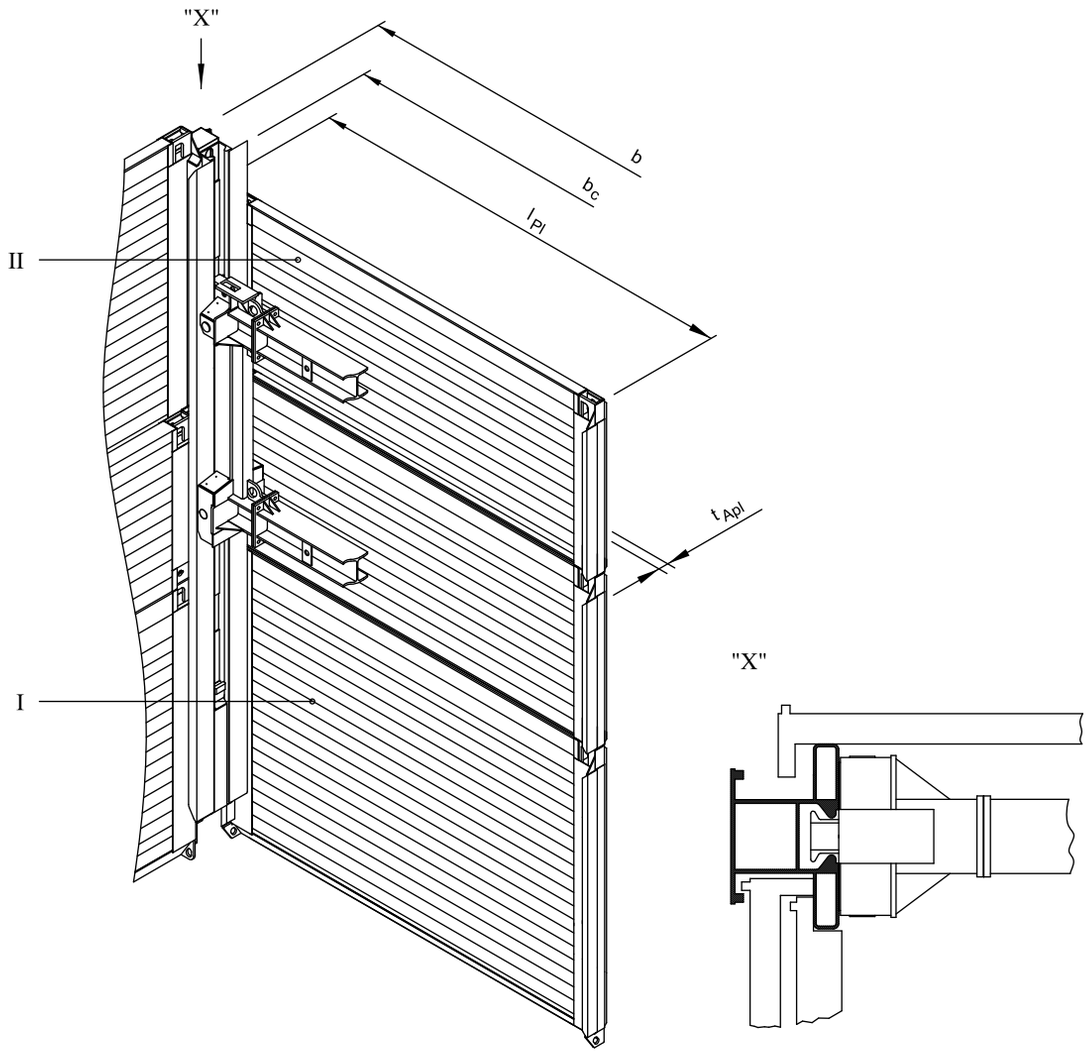
Once the complete desired train of shoring has been fully lowered to the bottom of the trench, pipe laying can start.

The roller units must be vertically positioned and fixed in order to provide the required structural strength.

Technical data sheet single-rail trench-end shoring

Trench end shoring with single slide rail system

End-of-trench shoring with slide-rail panels



I	Base panel	b	Shoring / trench width
II	Top panel	b_c	Inner width
l_{pl}	Panel length	t_{Apl}	Thickness outside panel

Kopfverbau mit Gleitschienenplatten

(All dimensions in mm)

Base panel -outside- (Height 2,32 m)

Art. No.	**l [m]**	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]
821 150	**2,00**	2,25	0,11	2,00	540,0	4,64
821 170	**2,71**	2,96	0,11	2,71	670,0	6,29
821 310	**3,15**	3,40	0,11	3,15	755,0	7,31
821 770	**3,75**	4,00	0,11	3,75	865,0	8,70
821 910	**4,00**	4,25	0,11	4,00	985,0	9,28
821 913	**4,25**	4,50	0,15	4,25	1.225,0	9,86
821 912	**5,00**	5,25	0,15	5,00	1.545,0	11,60
821 916	**6,25**	6,50	0,15	6,25	1.910,0	14,50

End-of-trench shoring with slide-rail panels

Top panel -outside- (Height 1,32 m)

Art. No.	**l [m]**	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]
822 075	**2,00**	2,25	0,11	2,00	365,0	2,64
821 190	**2,71**	2,96	0,11	2,71	450,0	3,58
822 310	**3,15**	3,40	0,11	3,15	510,0	4,16
822 710	**3,75**	4,00	0,11	3,75	580,0	4,95
822 810	**4,00**	4,25	0,11	4,00	640,0	5,28
822 813	**4,25**	4,50	0,15	4,25	900,0	5,61
822 815	**5,00**	5,25	0,15	5,00	1.130,0	6,60
822 830	**6,25**	6,50	0,15	6,25	1.400,0	8,25

Top panel -outside- (Height 2,30 m)

Art. No.	**l [m]**	l_M [m]	t_{pl} [m]	l_c [m]	G / VP [kg]	A [m²]
822 820	**5,00**	5,25	0,15	5,00	1.700,0	11,50

Shoring panels

see Double slide rail innercity linear shoring (page 8)

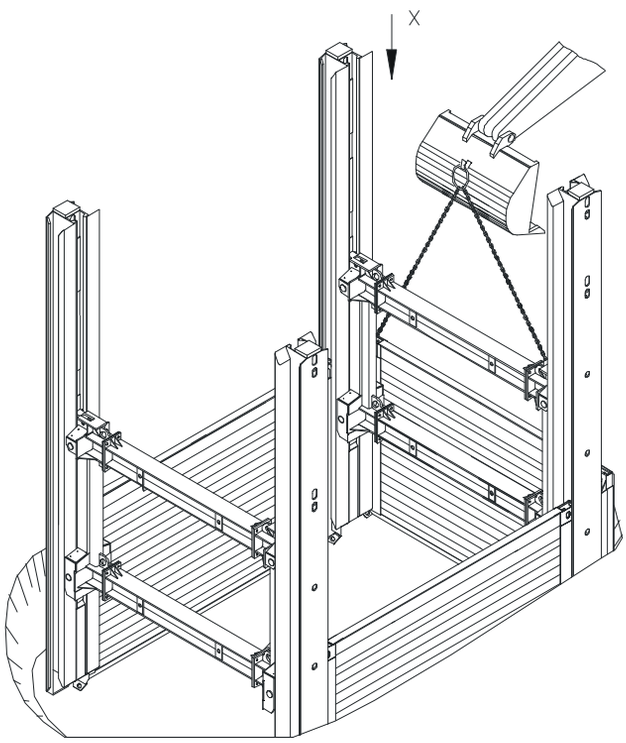
Trench widths

Art. No.	l_{pl} [m]	l_M [m]	min. b_c [m]	Extension bar combinations [mm]	max. b_c [m]	Extension bar combinations [mm]
821 150	2,00	2,25	1,490	2*20 / 550	1,725	275 / 550
821 170	2,71	2,96	2,180	2*20 / 140 / 1100	2,412	412 / 1100
821 310	3,15	3,40	2,690	140 / 1650	2,825	275 / 1650
821 770	3,75	4,00	3,240	140 / 2200	3,475	375 / 2200
821 910	4,00	4,25	3,475	375 / 2200	3,750	275 / 375 / 2200
821 913	4,25	4,50	3,790	140 / 550 / 2200	3,925	275 / 550 / 2200
821 912	5,00	5,25	4,475	275 / 1100 / 2200	4,612	412 / 1100 / 2200

l	Length	A	Area
l_M	Module length	G	Weight
l_c	Pipe culvert length	G / VP	Weight per shoring panel
b	Shoring / trench width	d	Diameter
b_c	Inner width	eh	Earth pressure max.
t_{pl}	Thickness		

Installation instructions for single-rail trench-end shoring

1. Inserting the base panel for trench-end shoring

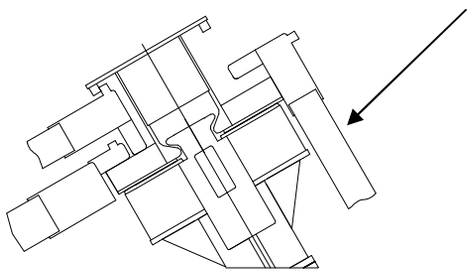


Assembly of the linear shoring frame is described in section 5. The following only describes the installation of trench-end shoring panels.

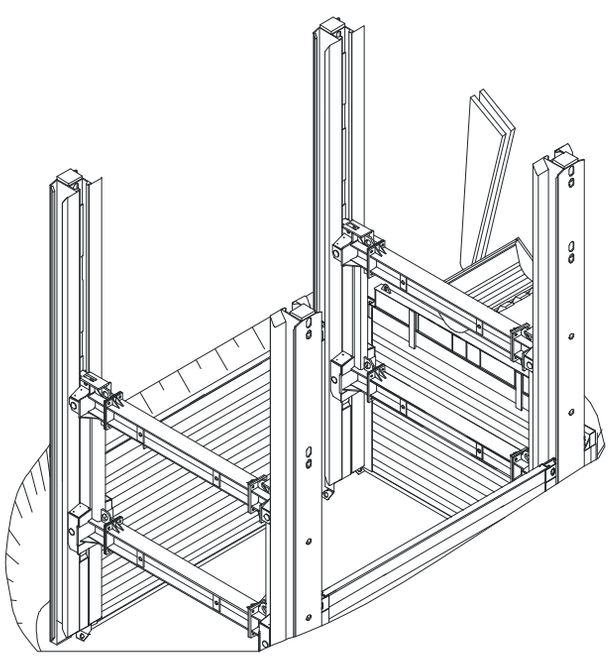
The lowering process for the linear shoring unit can be found in the *"Installation instructions for overlapping linear shoring*".

Using lifting gear and a suitable sling (GS-approved), insert the base panel for trench-end shoring into the profile of the linear shoring soldier (view X).

View X: Base panel for trench-end shoring



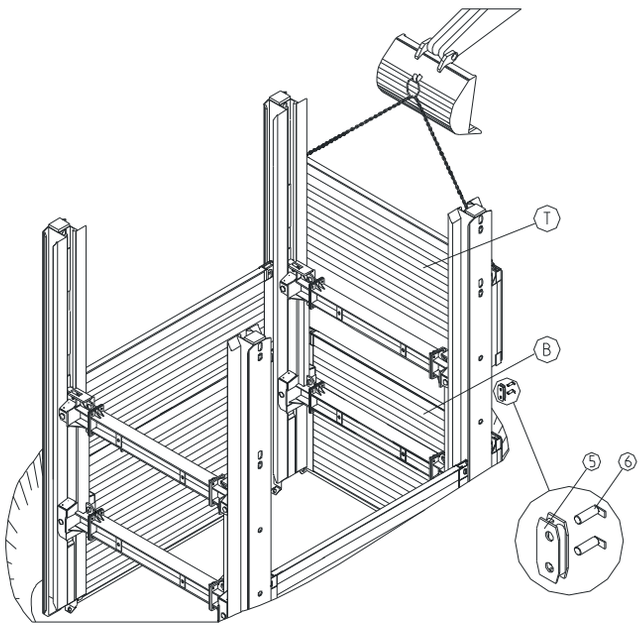
2. Lowering the base panel for trench-end shoring



Then insert the base panel for trench-end shoring (B) to the base of the trench with the aid of pressure panels.

The shoring components must be pressed and on no account struck or hammered.

3. Inserting and lowering the top panel for trench-end shoring



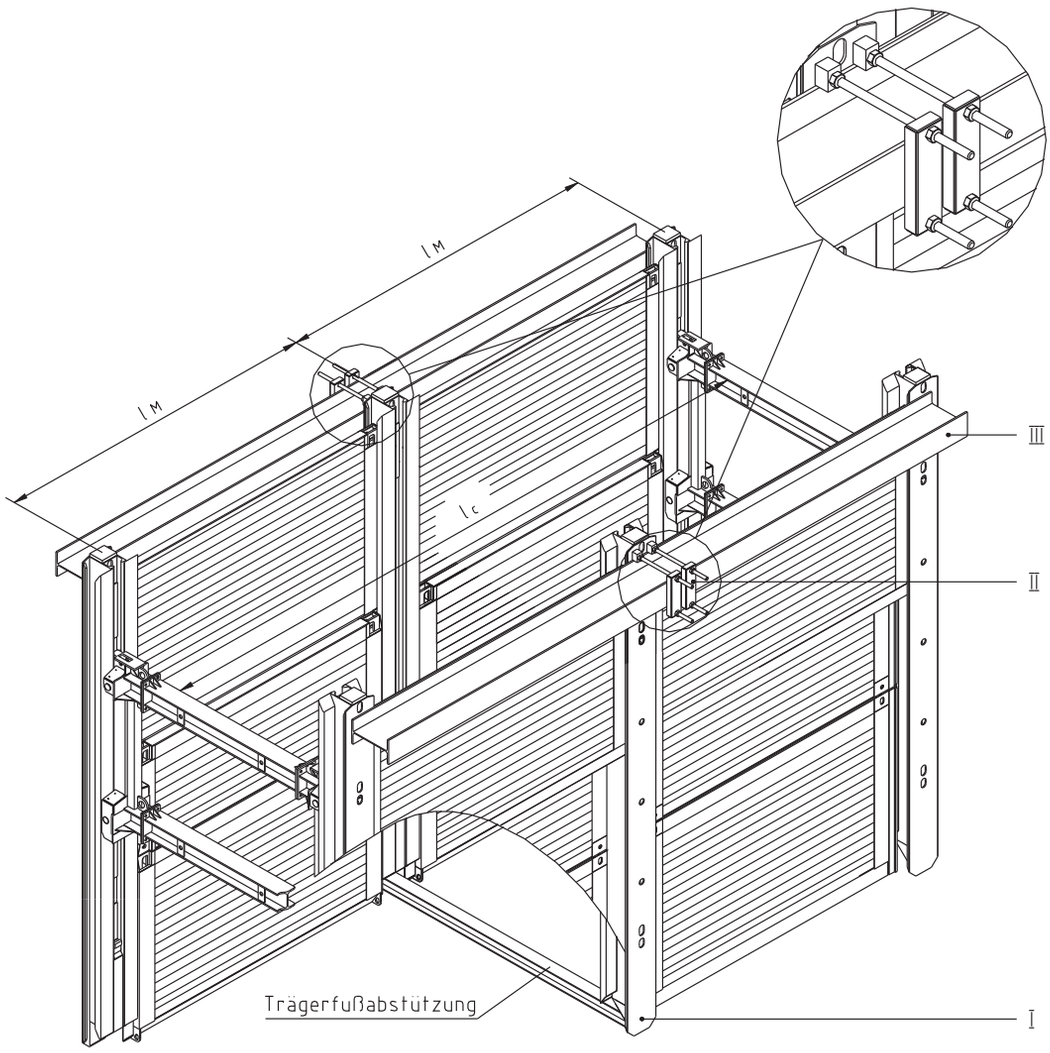
Further height adjustment of the wall of shoring can be achieved by using inner top panels (T).

The base and top panels must be joined together with connectors (5) and pins (6).

Here, again, it is essential that the top panels are pressed and on no account struck or hammered.

Technical data sheet for the "installation window"

(taking the example of overlapping linear shoring)



Trägerfußabstützung = Support for base of soldier

Linear shoring soldier with fastening on reverse		
l [m]	Art. No.	Wt/pc [kg]
No.	I	
4.13	820935	715
5.13	820912	995
6.13	820915	1200
7.13	820920	1410
8.13	820925	1630

Rear anchor for longitudinal waling girder			
LS girder		HE-B	
Art. No.	Wt/pc [kg]	Art. No.	Wt/pc [kg]
II		II	
855837	110	855836	80

Longitudinal waling girder			
LS girder			HE-B
l [m]	Art. No.	Wt/pc [kg]	
III			
6.13	820915	1200	Based on structural strength calculations
7.13	820920	1410	
8.13	820925	1630	

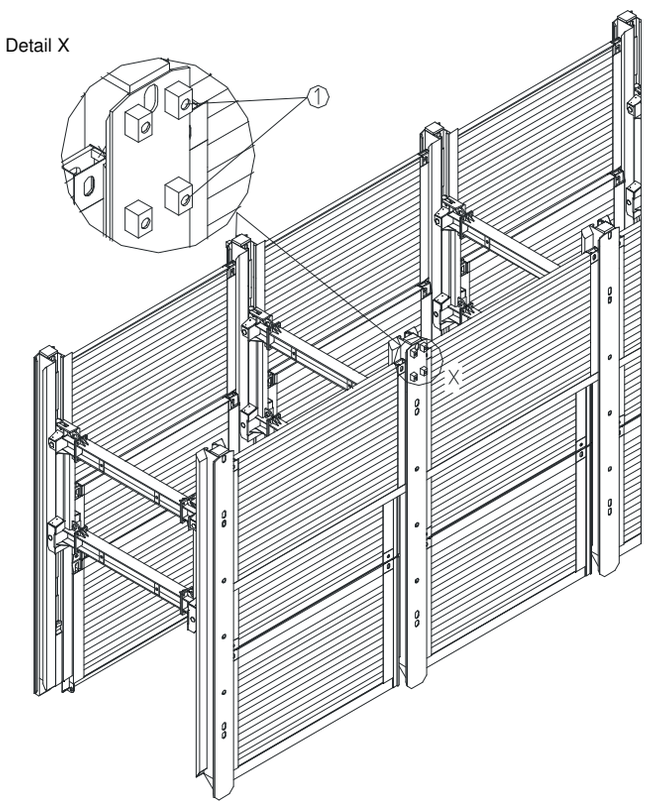
lc = 2 x lM – 250 mm

Installation instructions for "installation windows"

1. General remarks

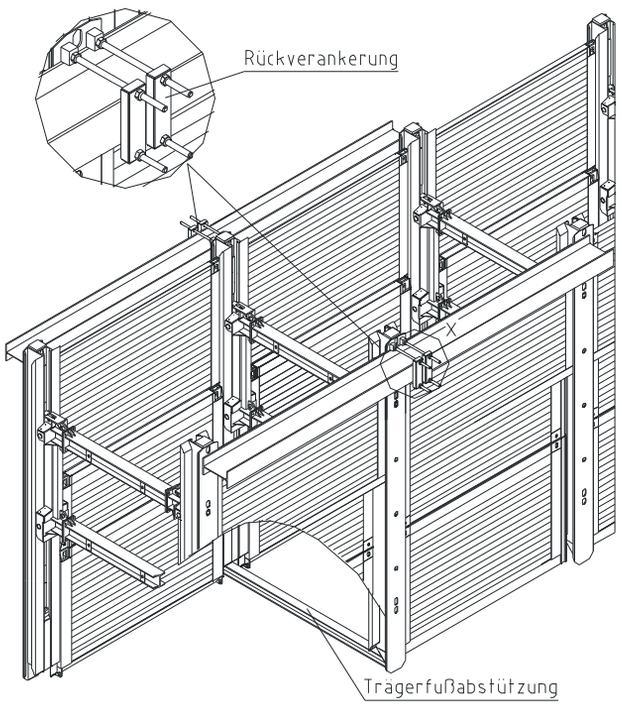
For large vertical clearances for the insertion and lowering of long pipes, precast concrete elements and horizontal drilling machines, large openings often have to be provided. This may be impeded by lateral bracing of the shoring with roller units and spacer bars. "Installation windows" are created for this purpose. Depending on the structural requirements, these can extend over two or more linear shoring units.

2. Installation to the base of the trench



To create such installation windows, special soldiers with fastening elements (1) attached to the reverse are provided. These are used for fastening horizontal waling girders on the outside. When the roller unit has been removed, these longitudinal waling girders form a support surface for the special soldiers and effectively serve as trimmer joists or headers.

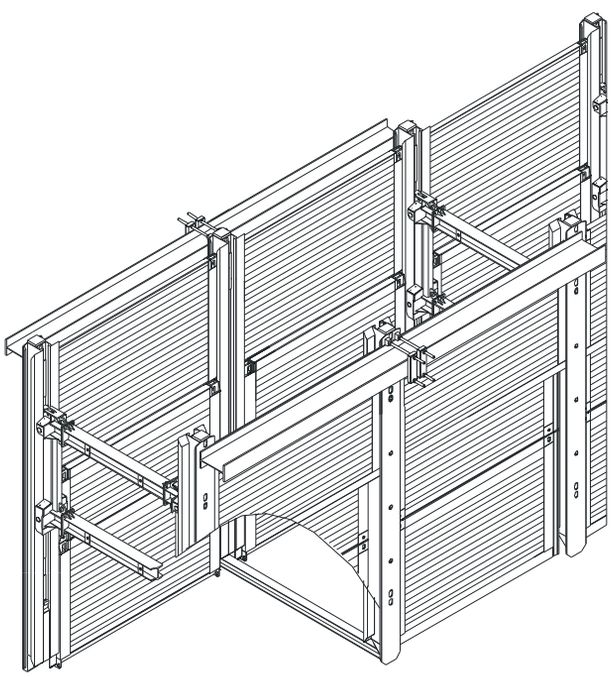
3. Support for the base of the soldiers and fitting the longitudinal waling girders



The scale of support for the base of the soldier depends on the calculation of structural strength and takes the form of a spar of steel or reinforced concrete. The outer longitudinal waling girders are fitted at the same time. These are deposited on wooden blocks, for instance, next to the shoring to protect them from dirt. They are firmly connected to the linear shoring soldier with the aid of threaded rods, fastening profiles, nuts and lock nuts.

Rückverankerung = Rear tie
Trägerfußabstützung = Support for base of soldier

4. Extracting the middle roller unit

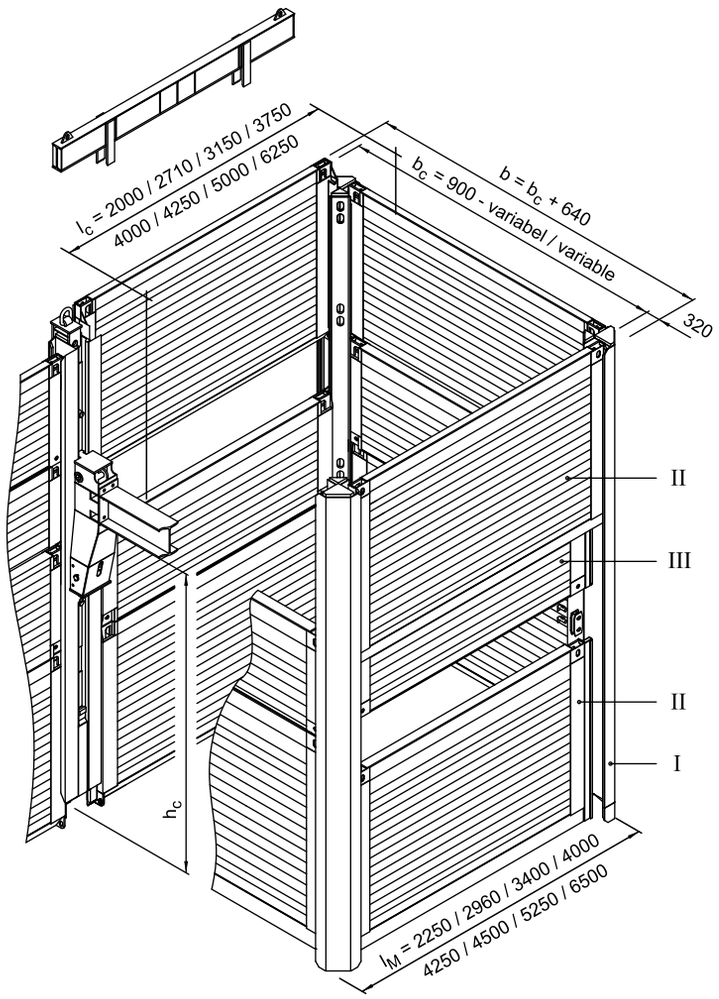


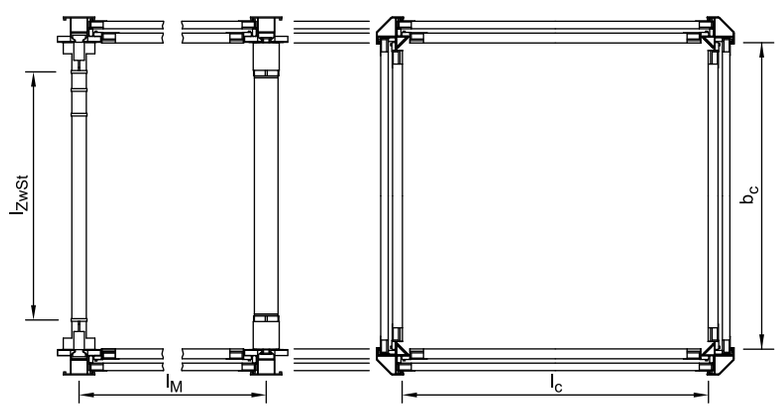
When the longitudinal waling girders have been firmly bolted to the vertical soldiers, the middle roller unit can be extracted.

Technical data sheet double slide-rail corner shoring

Double slide rail for corner post

Double slide rail for corner post





I	Corner post	b	Shoring / trench width
II	Base panel	b_c	Inner width
III	Top panel	h_c	Pipe culvert height
l_M	Module length	l_{ZwSt}	Length extension bar
l_c	Pipe culvert length		

Double slide rail for corner post

(All dimensions in mm)

Double slide rail for corner post

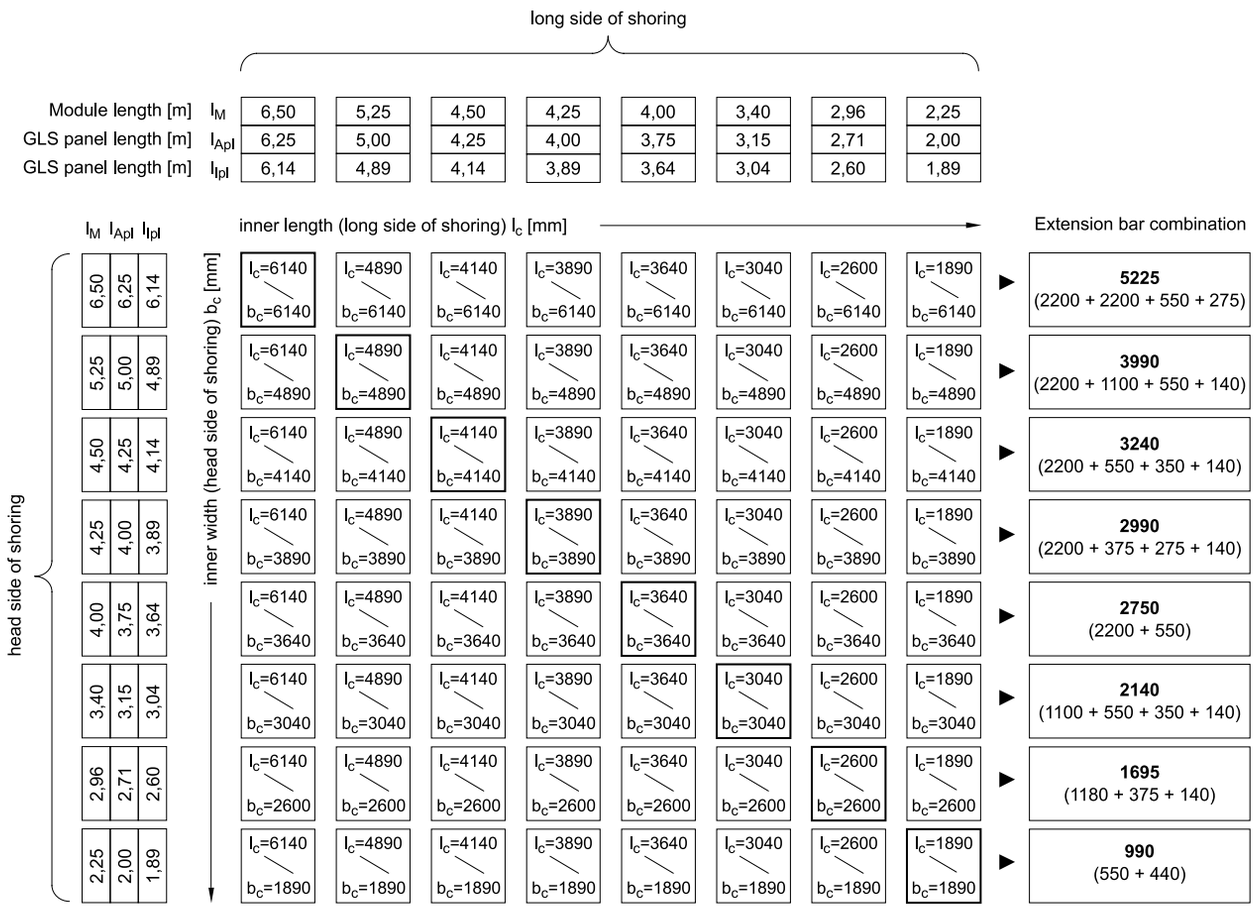
Corner post

Art. No.	Short description	l [m]	G [kg]
835 100	Corner post	**5,13**	720,0
835 120	Corner post	**6,13**	900,0

Shoring panels

see Double slide rail innercity linear shoring (page 8)

Ways of installation



Example:

Trench-end shoring module length = 3.40 m

-> Required extension bar combination for roller unit in linear shoring bay: 2140 mm

l	Length	l_{Ipl}	Inner panel length
l_M	Module length	b_c	Inner width
l_c	Pipe culvert length	G	Weight
l_{Apl}	Outer panel length		

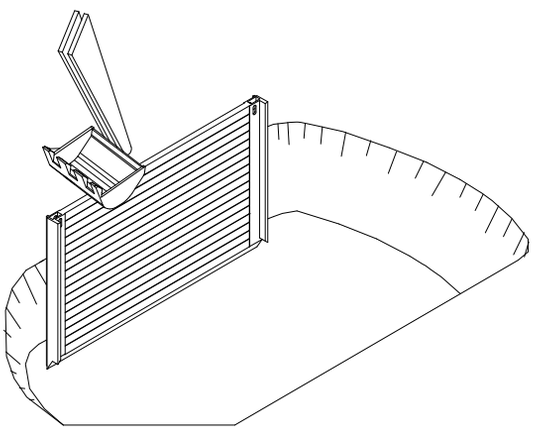
Installation instructions for overlapping corner shoring

1. General remarks

Corner rail shoring is a special shoring method for shaft structures as well as for trench shoring with combined trench-end units. If used for shaft shoring, special bracing systems can be omitted. All the forces are then discharged via the shoring panels. With the appropriate soldiers, it can take the form of single-rail or overlapping shoring.

By using different panel lengths in pairs, it is possible to realize rectangular pits of varying sizes.

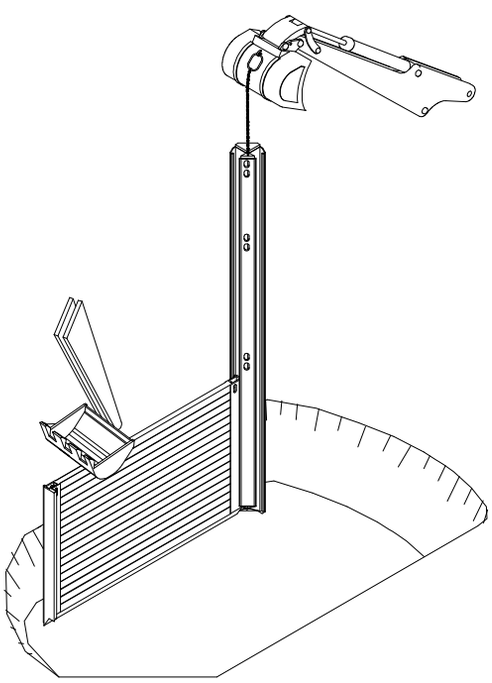
2. Installing the outer base panels



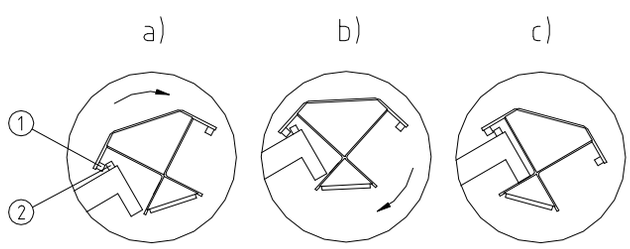
After measurement of the pit, the initial layer of soil is excavated for the shaft to match the panel lengths used. The project management's instructions and the relevant standards must be observed.

The first shoring panel (outer base panel) is lifted with lifting gear and suitable slings (GS-approved) into the pit and fixed.

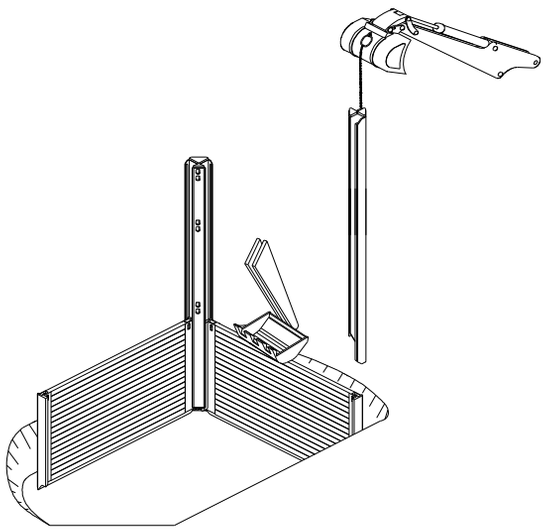
3. Installing the corner rail



By using a second set of lifting gear, the corner rail can be pivoted in (see figures a, b and c) or slotted in from above. Make sure that the rectangular profile (1) on the reverse of the shoring panels catches behind the rectangular profile (2) of the shoring panel.

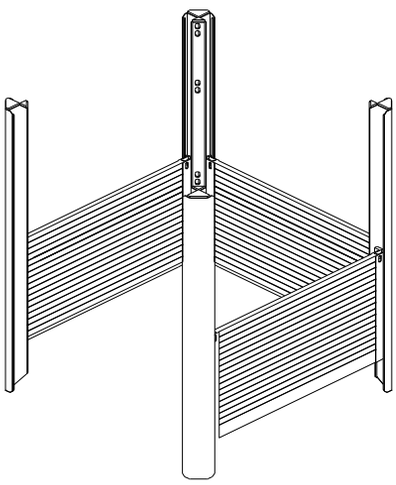


4. Installing further elements



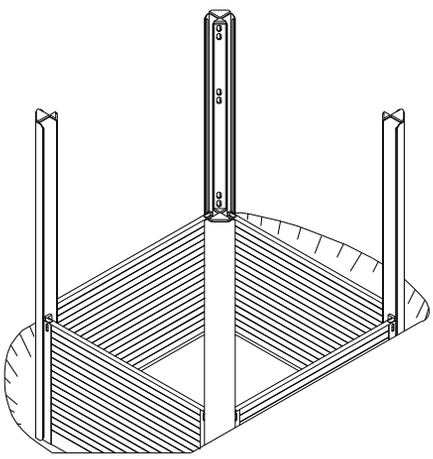
All further elements must be installed in the manner already described.

5. Aligning the shoring



So that even the last wall of shoring can be installed without difficulty, the shoring has to be properly aligned. To this end, it is important here that the horizontal clearance between the shoring panels is the same at both panel ends; and that the two diagonal axes of the shoring bay are the same length.

6. Lowering the shoring

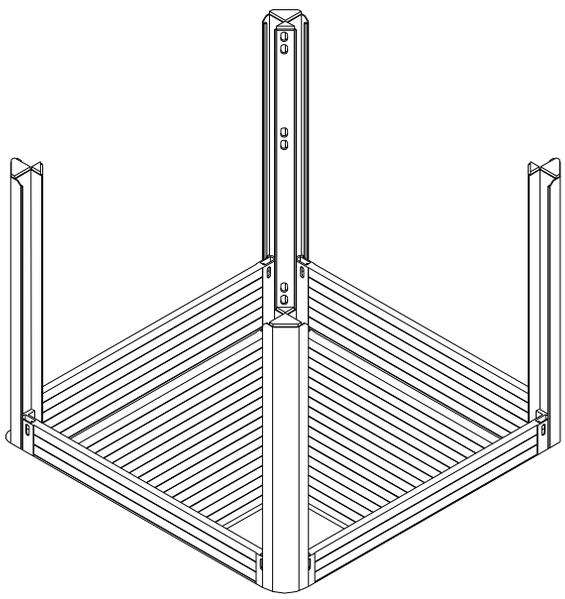


When the fourth base panel has been installed, the rectangularity of the shoring must again be checked. Then the cavity between the soil and outer walers must be backfilled and compacted.

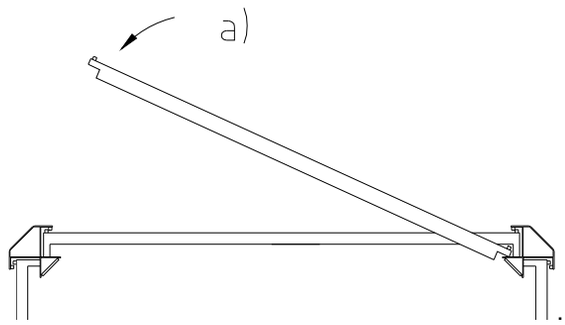
Before the lowering process proper, the soil beneath the shoring panels and soldiers is excavated in accordance with the project management's instructions. The soldiers and shoring panels are pressed down alternately, with special use being made of pressure beams for the shoring panels.

The shoring components must be pressed and on no account struck or hammered.

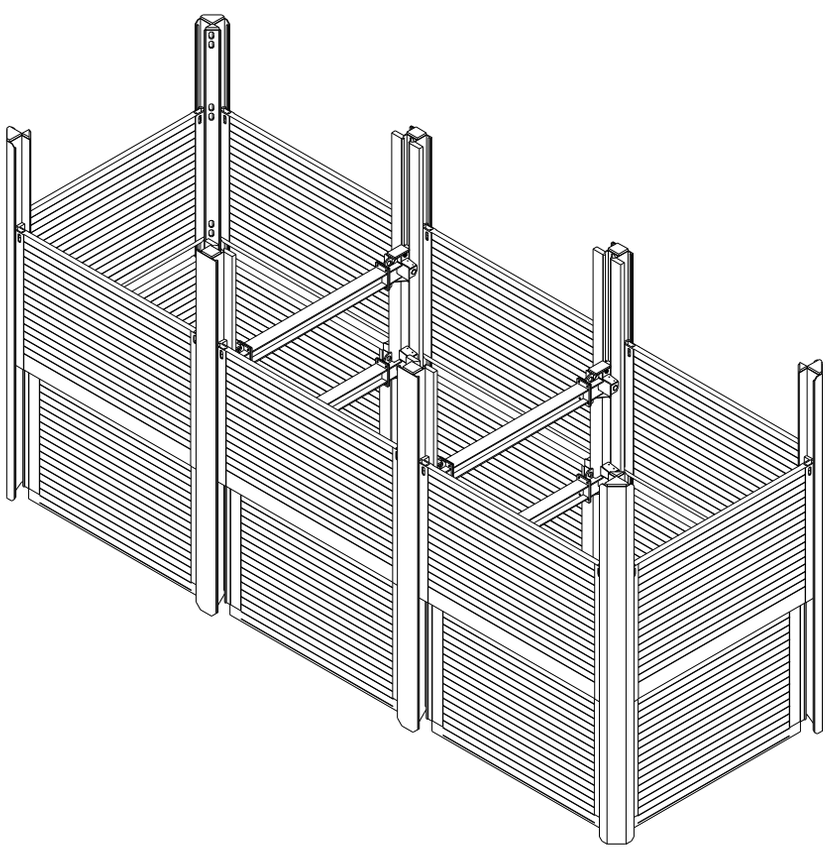
7. Installing the inner base panels



As shown in figure a, the inner base panel is pivoted between the guide frames, guided in the U-shaped guide rails of the outer panels and lowered to the bottom of the trench. Trench excavation continues with the lowering of the inner base panels and guide frames.



8. Example of a trench-end unit

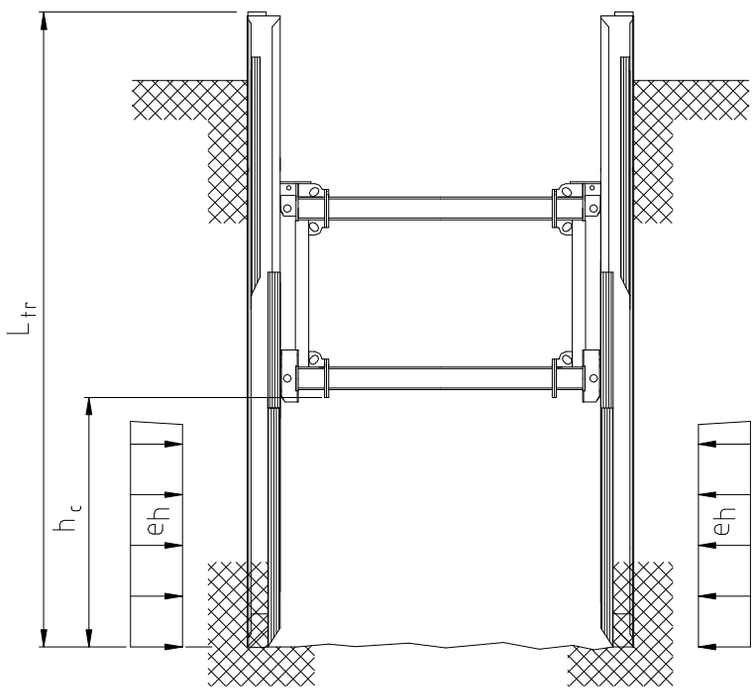


There is no problem combining overlapping linear shoring with overlapping corner shoring. This way it is possible to continuously shore pits and trenches.

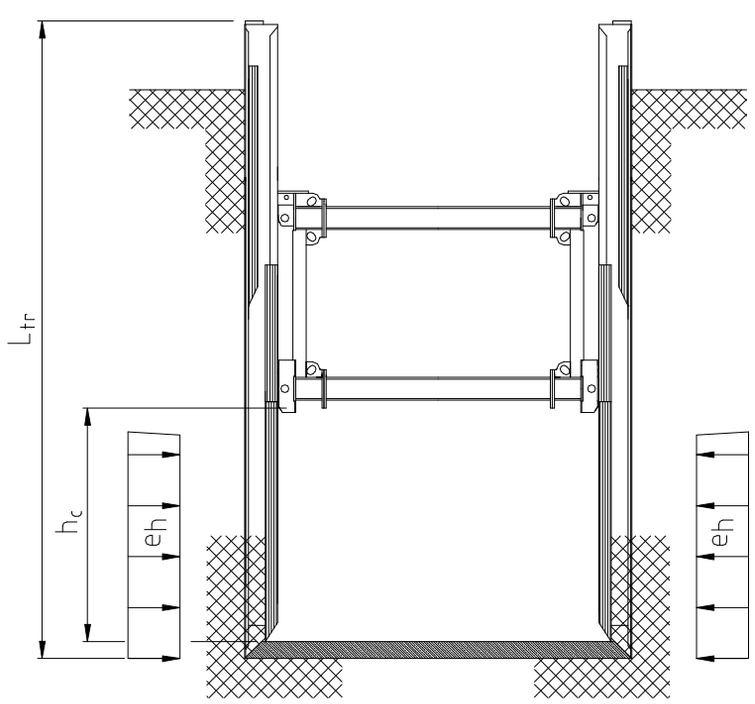
Load diagrams

Design versions

Support type I with free cantilever (load diagrams 1 to 7)



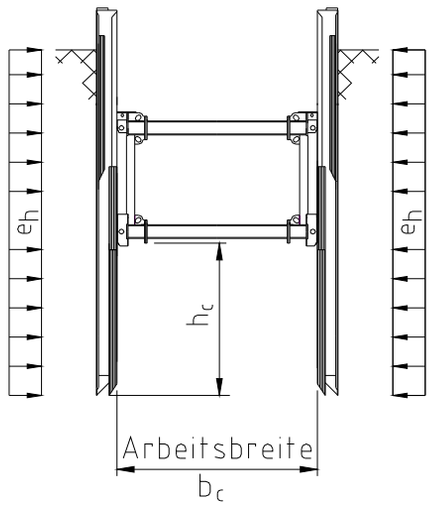
Support type II with support for base of soldier (load diagram 8)



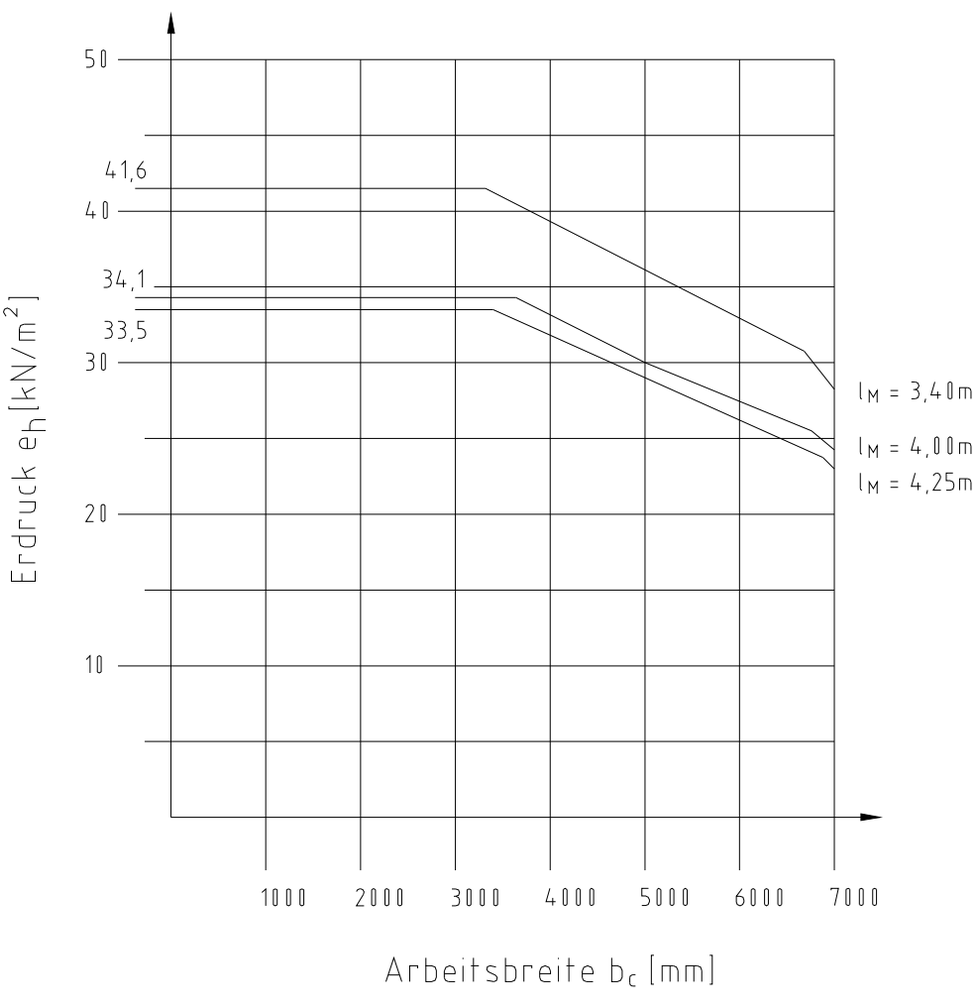
Support type I with free cantilever

Load diagram 1; h_c = 1.45 m

Type of shoring panel	GLS
Soldier length	L_{tr} = 6.13 m
Module lengths	l_M = 3.40 m / 4.00 m / 4.25 m
Vertical pipe clearance	h_c = 1.45 m

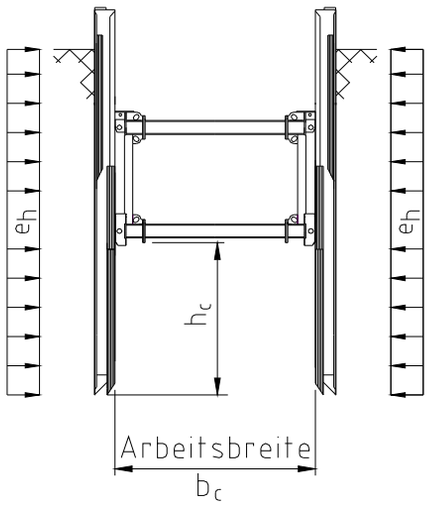


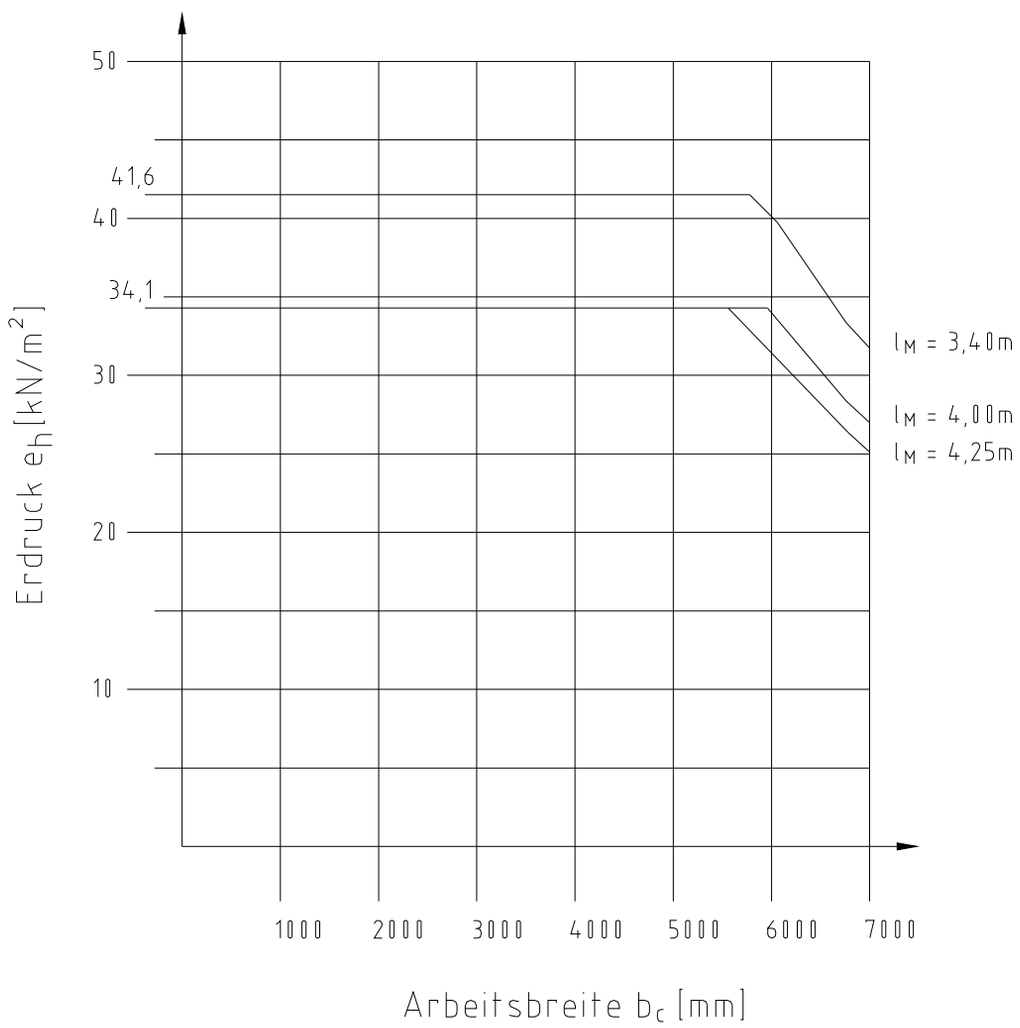
Arbeitsbreite = Working width
Erddruck = Soil pressure
((Kommas sind durch Punkte zu ersetzen!))



Load diagram 2; h_c = 1.95 m

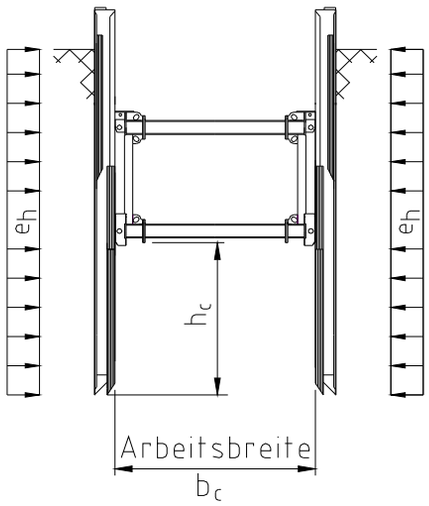
Type of shoring panel	GLS
Soldier length	L_{tr} = 6.13 m
Module lengths	l_M = 3.40 m / 4.00 m / 4.25 m
Vertical pipe clearance	h_c = 1.95 m

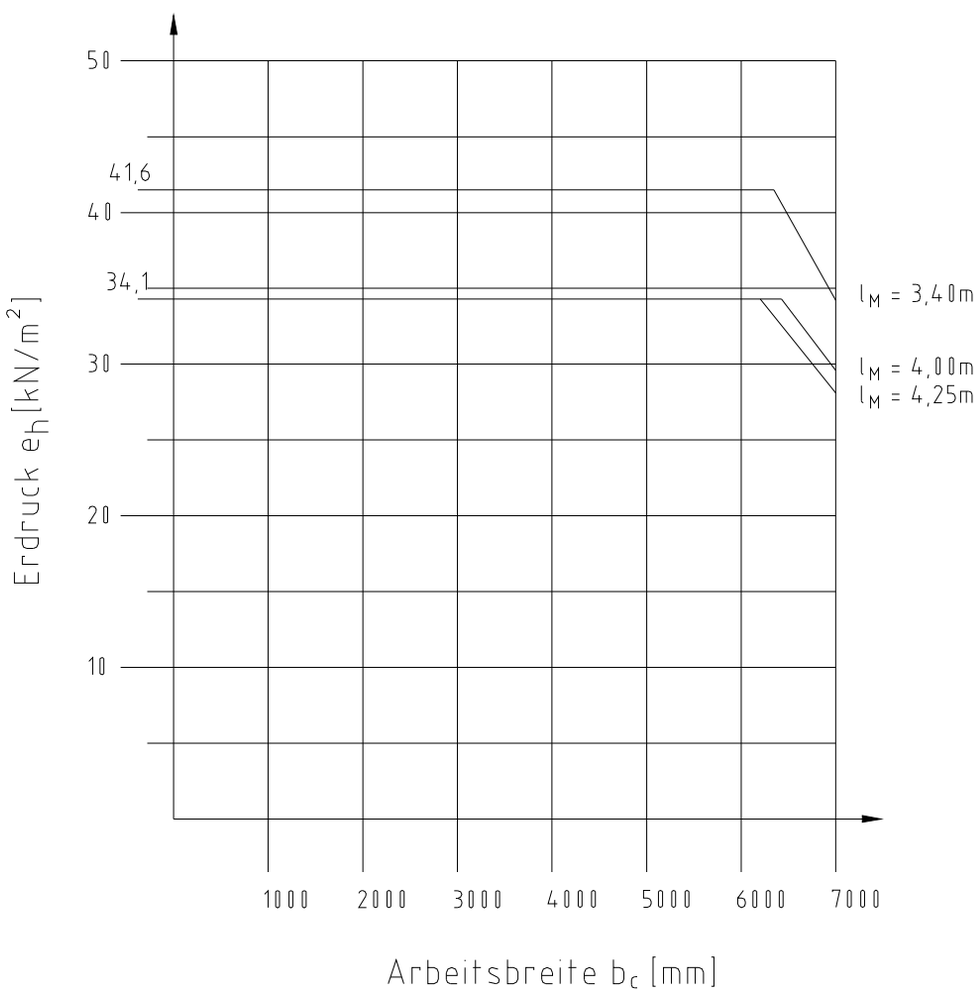




Load diagram 3; h_c = 2.10 m

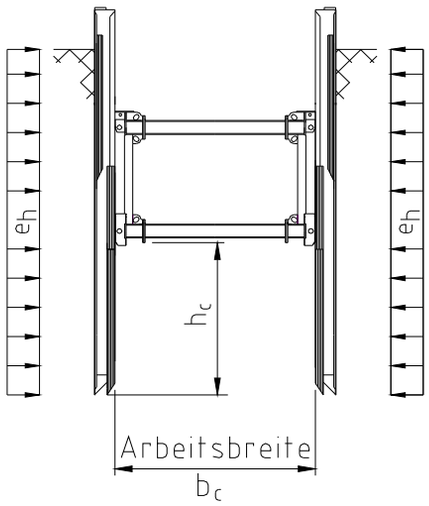
Type of shoring panel	GLS
Soldier length	L_{tr} = 6.13 m
Module lengths	l_M = 3.40 m / 4.00 m / 4.25 m
Vertical pipe clearance	h_c = 2.10 m

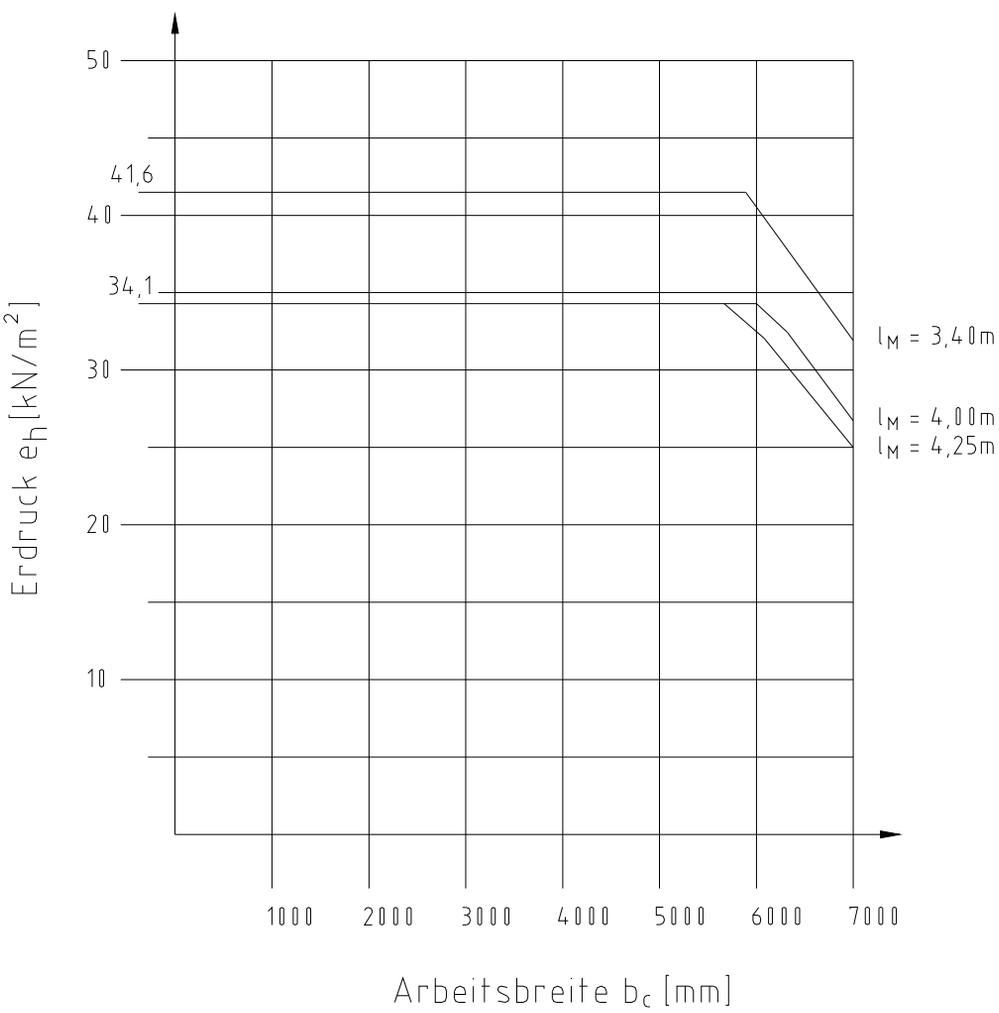




Load diagram 4; h_c = 2.25 m

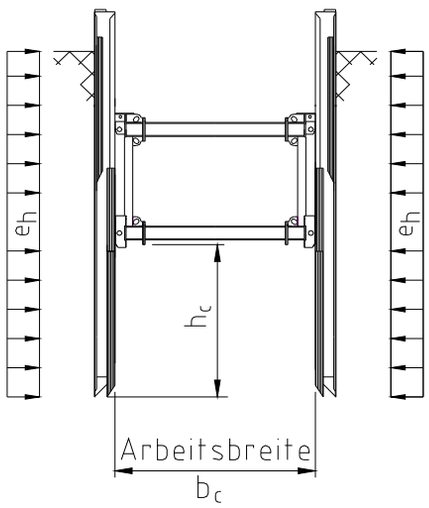
Type of shoring panel	GLS
Soldier length	L_{tr} = 6.13 m
Module lengths	l_M = 3.40 m / 4.00 m / 4.25 m
Vertical pipe clearance	h_c = 2.25 m

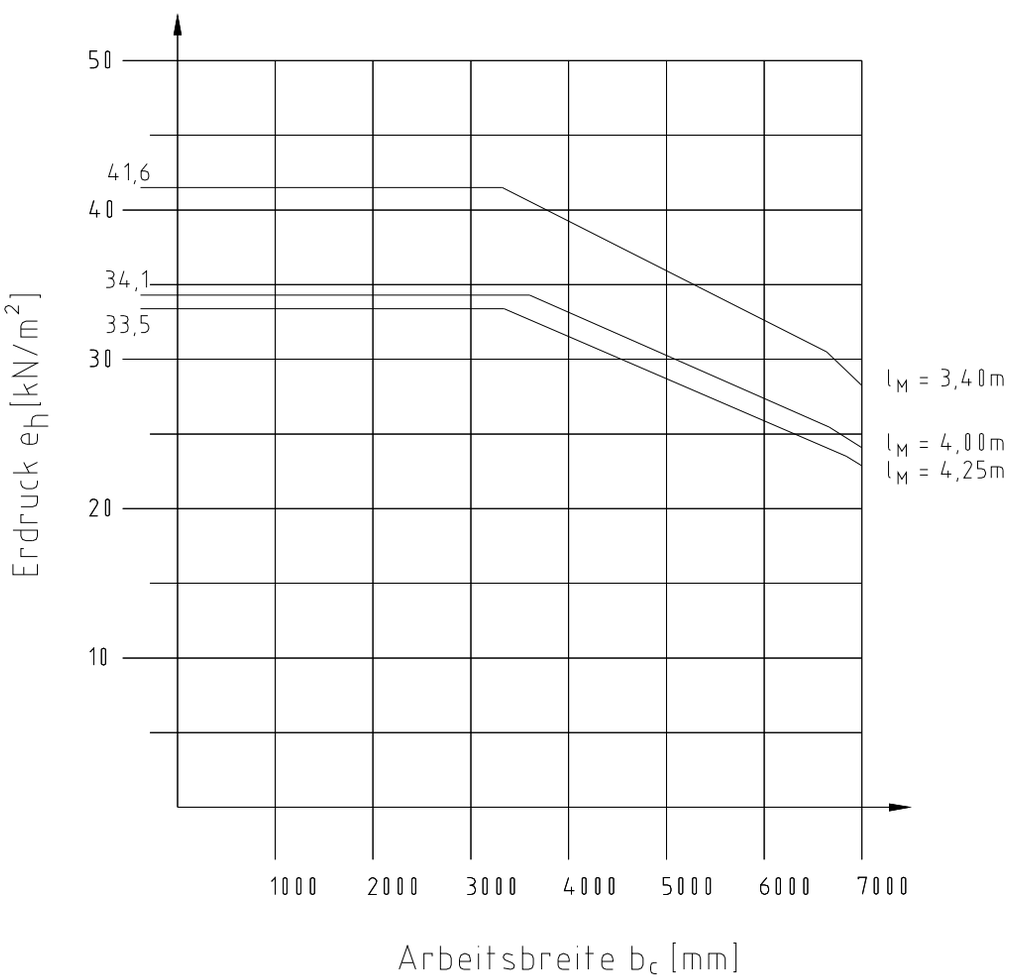




Load diagram 5; h_c = 2.75 m

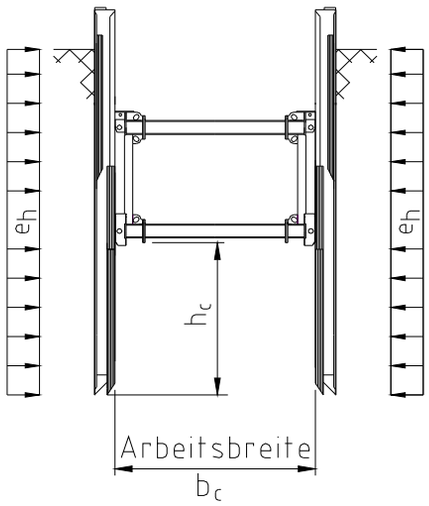
Type of shoring panel	GLS
Soldier length	L_{tr} = 6.13 m
Module lengths	l_M = 3.40 m / 4.00 m / 4.25 m
Vertical pipe clearance	h_c = 2.75 m

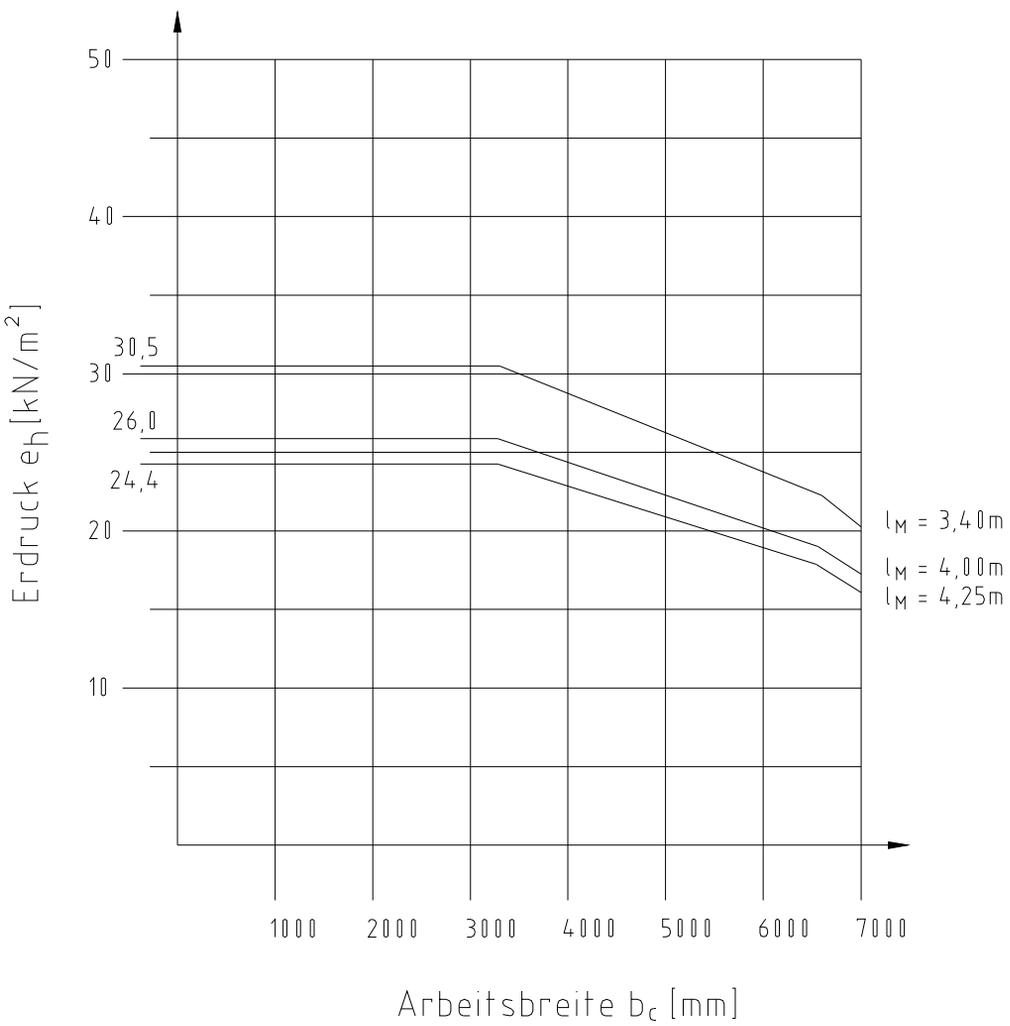




Load diagram 6; hc = 3.25 m

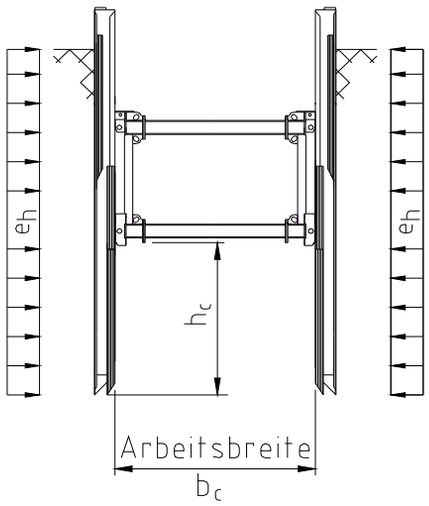
Type of shoring panel	GLS
Soldier length	L_{tr} = 6.13 m
Module lengths	l_M = 3.40 m / 4.00 m / 4.25 m
Vertical pipe clearance	h_c = 3.25 m

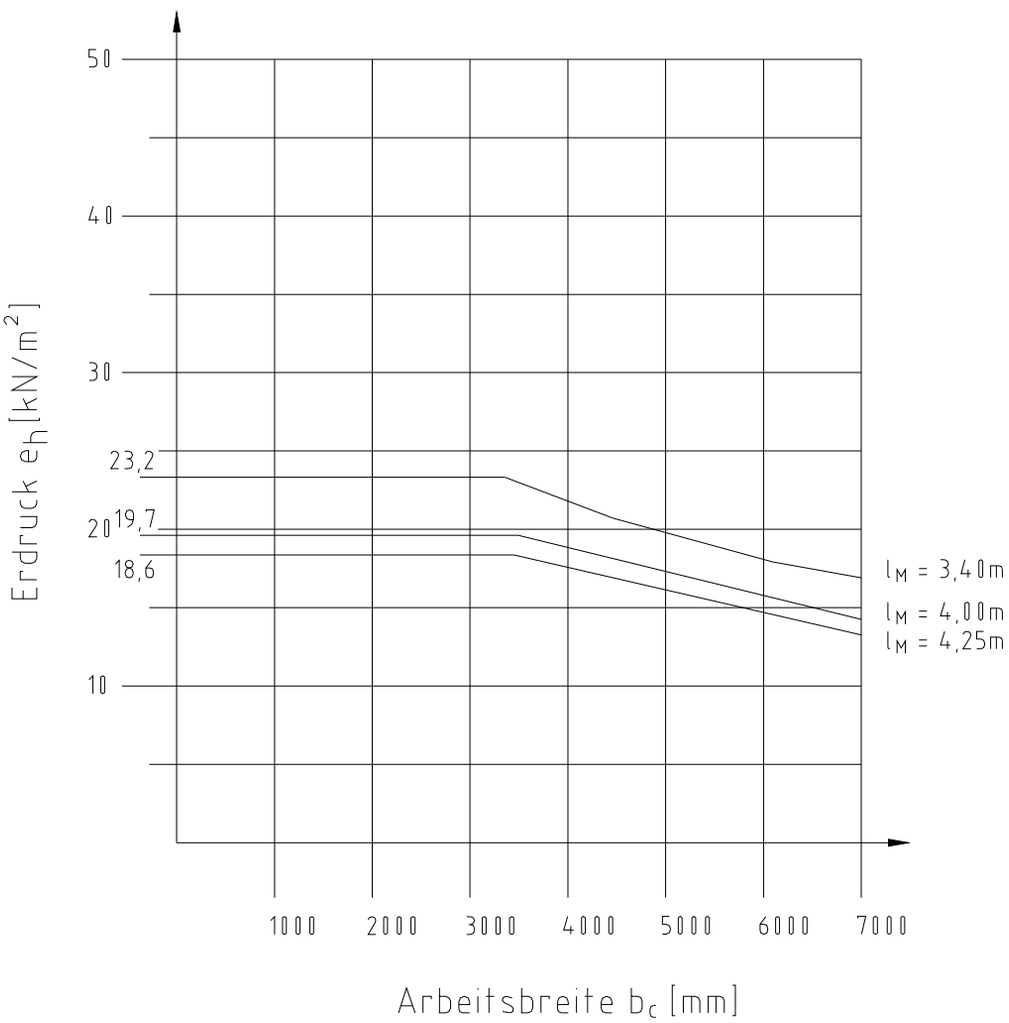




Load diagram 7; hc = 3.75 m

Type of shoring panel	GLS
Soldier length	L_{tr} = 6.13 m
Module lengths	l_M = 3.40 m / 4.00 m / 4.25 m
Vertical pipe clearance	h_c = 3.75 m

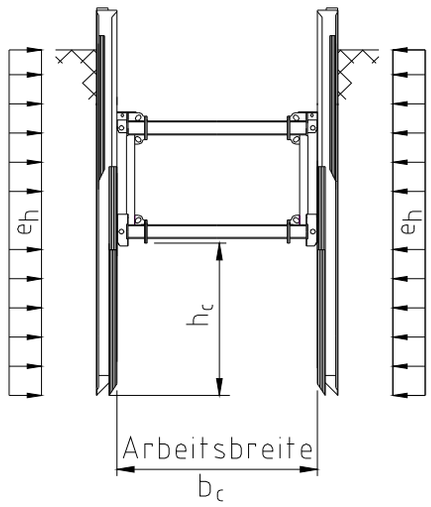


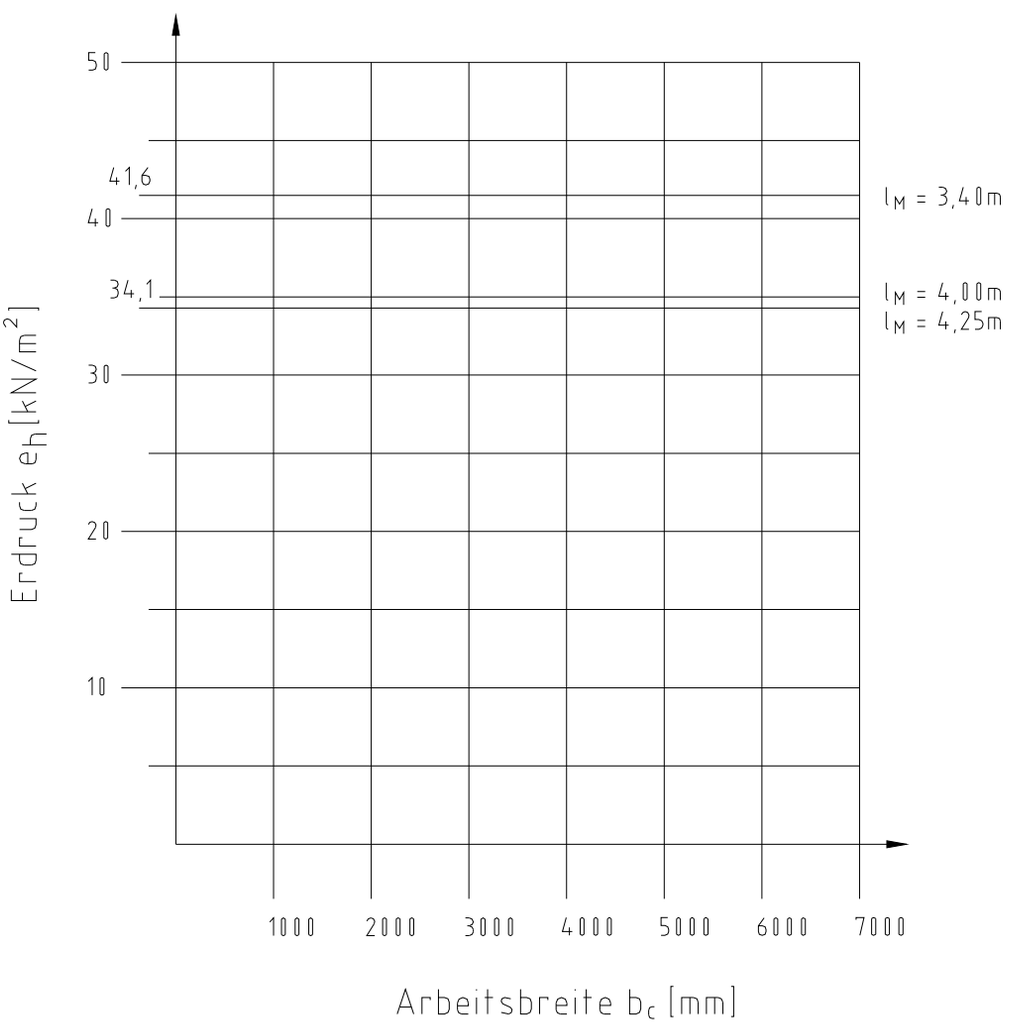


Support type II with support for base of soldier

Load diagram 8; h_c <=5.50 m

Type of shoring panel:	GLS
Soldier length	L_{tr} = 6.13 m
Module lengths	l_M = 3.40 m / 4.00 m / 4.25 m
Vertical pipe clearance	h_c <= 5.50 m





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